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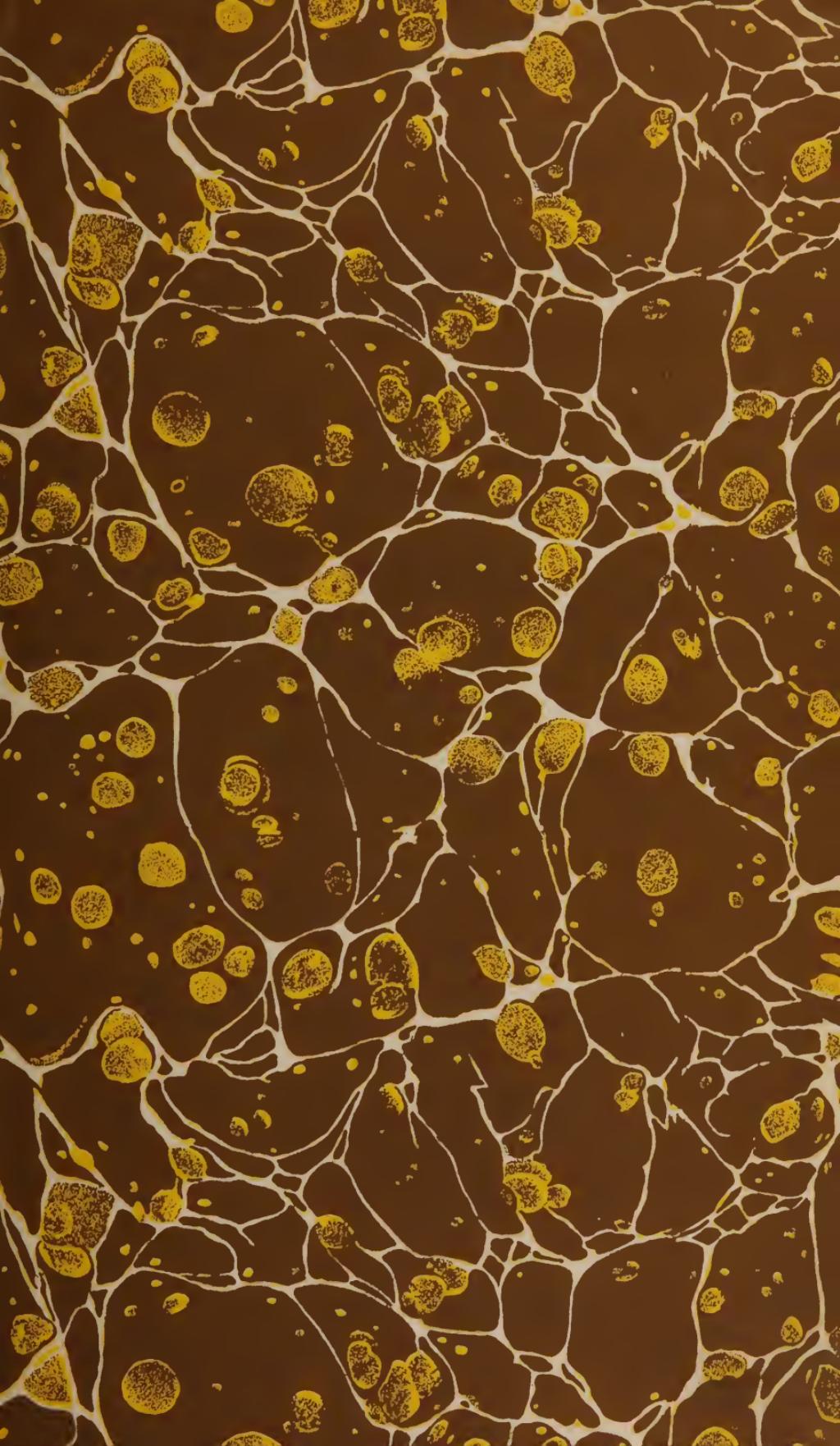


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THE
PHILADELPHIA
SYSTEM OF OBSTETRICS,
IN TWELVE PARTS.

FULLY ILLUSTRATED.

DESIGNED FOR A TEXT-BOOK FOR STUDENTS, AND AS REFERENCE FOR
THE PRACTITIONER.

By JOS. S. LONGSHORE, M. D.

PROFESSOR OF OBSTETRICS AND DISEASES OF WOMEN AND CHILDREN IN THE
PHILADELPHIA UNIVERSITY OF MEDICINE AND SURGERY, AND LATE PROFESSOR
OF OBSTETRICS, ETC., IN THE PENN MEDICAL UNIVERSITY OF PHILADEL-
PHIA, AND FEMALE MEDICAL COLLEGE OF PENNSYLVANIA, FELLOW
OF THE MEDICO-CHIRURGICAL COLLEGE OF PHILADELPHIA,
MEMBER OF THE NATIONAL MEDICAL ASSOCIATION OF
THE UNITED STATES OF AMERICA. AUTHOR
OF THE PRINCIPLES OF NURSING,
ETC., ETC., ETC.

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P R E F A C E.

IN offering to the profession and medical students of the United States a new work on obstetrics, we are not unmindful of the number of excellent books already extant upon the subject. It is not that we are vain enough to suppose that the result of our labors will surpass these in excellence, or receive a higher appreciation. Our object has not been to excel the productions of our learned predecessors and contemporaries, either in scientific merit or depth of research, but to present in a plain, familiar manner what we have learned from others, the result of our own experience, and what conclusions we have arrived at from long and mature reflections.

What we have gathered from our researches, that appears sound in philosophy and correct in theory, we have adopted, while that which bears the impress of fallacy or error, has been discarded, without regard to the obscurity, on the one hand, or the respectability or weight of authority that may have passed under review, on the other; our sole object has been to collect the glittering gems of truth from whatever source we could make available, and arrange them in a casket that may remain imperishable through all coming times as the truth itself is imperishable.

When we received the degree of Doctor of Medicine and our diploma in the University of Pennsylvania, just one-third of a century ago, we had laid no plans, nor formed any purposes for the future, our highest ambition was to secure a comfortable life-sustaining practice in some pleasant country village. This was soon accomplished, and our success was equal to that of most young men fresh from the lecture rooms. We then had made choice of no particular branch of the profession, but diligently applied ourselves to the study and duties of general practice. Within the first few years of our professional career there occurred two instances that inclined our mind strongly towards making the study of obstetrics and the diseases of women the special one of our life. The first was a case of most terrific puerperal convulsions, that occurred in the person of a very near and dear relative, which recovered under our charge, after being abandoned as hopeless by three of the most experienced and distinguished physicians of the neighborhood. Encouraged by our success in this case we engaged in the study and practice of obstetrics with zeal, and a determination to further be able to surmount what other difficulties might be lying in wait for us along the pathway of professional life.

A short time subsequently to this event, we were consulted by a distinguished medical friend, in an adjoining district, in regard to the case of a most estimable and accomplished young lady, the only daughter of very respectable parents.

The difficulty was serious menstrual derangements, with chlorosis and a hopeless deterioration of her general health, which, after a protracted and painful duration, finally terminated fatally. This sad mischief resulted from a misdirection of that innate modesty which is the

gem of the female character. She refrained from acquainting her mother even with her condition, until the visible marks of declining health betrayed the presence of some grave internal difficulty, from a dread of making the necessary revelations to her physician; finally, when the alarmed mother summoned to her aid a medical friend it was too late, the vital springs had already been tapped, and her young life was gradually ebbing away. This case, in connection with the difficulties we had frequently encountered in our own experience, in gaining satisfactory information with reference to the peculiar ailments of young and timid females, led us seriously to consider the propriety of supplying, what appeared to us, a most important desideratum in the profession, by properly educating women in the art and science of medicine. The relation between the sensitive and delicate female invalids, and these medically educated ladies, as their physicians, would be more intimate, and the difficulties, familiar to every male practitioner attending the acquisition of necessary information in reference to such cases, would not exist in regard to them. And it was thought that much good would result to the sex from such an arrangement. After more than ten years earnest deliberation, during which time many observations were made in confirmation of the necessity of the measure, and receiving encouragement from a large number of liberal-minded members of the profession throughout the country, and most especially from our excellent friend, Dr. JOHN H. GORDON, of Pa., a retired Surgeon of the U. S. Navy, who has long since departed to a brighter and better world, and from the brilliant achievements of those two French ladies, Madame LA CHAPPELL and Madame BOIVIN, who are renowned throughout the world, and whose works have added lustre to the scientific character of France, and to the medical

profession everywhere, we applied to the Legislature of our own State, and procured a charter for "The Female Medical College of Pennsylvania," granting it equal privileges and immunities with any medical institution in the commonwealth. With the co-operation of a few friends the college was organized under the charter, and on the 7th of September, 1850, with a full faculty, commenced the first course of regular medical instructions ever given to a class of women in the United States, or the world, ourself occupying the chair of obstetrics and the diseases of women and children. Thus were we the humble instrument of opening to woman a new field of enterprise, and at the same time honestly endeavoring to fill a most important blank in the profession that no man possessed the natural qualifications of doing; and we have never regretted the part taken in the transaction, further than that which arose from a failure of the organization to meet the high expectations we, and its best friends, had entertained of it. After the third course of lectures delivered in the institution, we dissolved our connection with it, with feelings of regret that the management of it was, unfortunately, committed to hands incompetent to insure its success.

We should not have intruded this item of medical history upon the reader in this place, were it not that our identity with it constituted one of the events that led us to make the subject of the present work the theme of a life-long study; and had it not been for that, our interest in the subject might have waned instead of increased as time advanced. Though at present dissolved from all connection with the medical education of women, we yet regard it as one of the advanced epochs of the age, from which will date a most important improvement in medicine, one that will redeem the sex from much needless

suffering, and often premature death, when it comes to be appreciated in the light in which it was commenced, and conducted by competent and efficient managers.

After our appointment to the professorship of obstetrics and the diseases of women and children in the Philadelphia University of Medicine and Surgery, in 1865, we were requested to prepare a text book upon our especial branch for the school, which should embrace, as far as a work of the kind can be made to do, the broad and liberal principles upon which the teachings of the institution are based. After due reflection upon the matter, and opening an extensive correspondence, and accumulating a large amount of material for such a work from our past experience, and that of our correspondents, and making such preparations as were necessary, so as to enable it to proceed as uninterruptedly as possible, we commenced the work on the 20th of October, 1866, since which time we have given it almost our undivided attention. Disputed points we have endeavored to discuss with candor, having no malice towards any one, nor unkind feelings to gratify, we have entered into the examination of all mooted questions, only with a desire to elicit the truth. Entertaining no prejudices against, nor predilections for any of the dominant medical sects of the day, we have neither favored one, nor censured another; but have endeavored to deal fairly with all, and without referring to any as a particular system or ism, have drawn more or less of what we conceive to be the truth from each. In this respect the book goes into the hands of the medical student and the profession with a different character from any other medical text-book extant. In addition to the broad liberality of thought it inculcates, simplicity and perspicuity have been studied in its details, an excess of technicalities has been avoided. Every subject is treated upon the

presumption that the reader is only a novitiate in the science and art of obstetrics, whose sole desire is to learn, hence the subject-matter of the volume is presented in as plain and comprehensible language as is consistent with scientific accuracy.

In the arrangement of the work, no plan has been studied, no author imitated, but the various subjects have been considered from the first, as they naturally grow out of each other, and as we have always considered them in our public lectures; thus the student is conducted on step by step, from one topic to another, in the natural order of their occurrence, and, as far as possible, the connecting links between them are maintained from the first to the last.

In the progress of the work it will be observed that some new ideas have been incorporated, and that some of the old ones, which have prevailed from time immemorial, have been examined and discarded. It is conceived to be a great fault with medical writers, in view of the much needed advance in medical science, to follow each other, and thus perpetuate erroneous doctrines, without thoroughly examining their claims to the credence of the profession. Where an author has gained great celebrity and distinction in his day, it has generally been by exposing and correcting the errors of his predecessors, while at the same time he has transmitted to his posterity as great errors, overlooked by him, as those he has corrected. These have been unnoticed and repeated by his successors, or allowed to pass from a dread of the criticisms their exposure and correction might excite from the too confiding disciples of the former. Thus, either from a want of discernment, or a dread of criticism, have gross errors and grave fallacies been perpetuated, and permitted to encumber our text-books, until the student, relying upon

the wisdom and judgment of his teachers, is misled into a labyrinth of difficulties, of which he is not aware, until he comes to test his acquired skill at the bed-side of the patient, when he finds, too late, that many of the so-called truths in theory and facts in practice are deceptive, and one of his first duties to insure him success is to commence unlearning much that he has learnt, and to rely upon good common sense, instead of the theories of the schools.

In our efforts to purge obstetrics of what is false and erroneous, we may have failed to discern much that needs reviewing, but we disclaim that we have been influenced by the dread of criticism. We acknowledge that we have reviewed several, what appeared to us, palpable absurdities, that have been sustained by the most eminent authorities, and, in doing so, we expect in return to pass under the review of the critics; but as our sole object is to disabuse science, and institute truth for error, we are willing to submit our strictures upon, what we conceive to be, unsound in philosophy and false in point of fact, to the ordeal that awaits every divergence from established theories, whether true or not, and abide by the result. If we have, in our endeavors to improve a science acknowledged to be defective, strayed so far from our intentions as to substitute new errors for old truths, or new follies for ancient wisdom, we would be under obligations to have our misdirected efforts corrected, and crave pardon for the injury we may have unwittingly committed to the cause of science. And, on the contrary, if our observations be found to accord with truth and philosophy, we expect our reviewers will be as free to award us the credit of having done something for science, as they otherwise would be to condemn our efforts as chimerical or stupid.

To those kind friends who have extended to us their generous sympathy and a helping hand in our arduous and responsible undertaking, we tender our sincere gratitude; and to MR. HUGO SEBALD, the artist, we award our particular thanks, for the promptness and skill in the execution of the engravings with which the work is illustrated.

THE AUTHOR.

AUGUST 6TH, 1868.

INTRODUCTION.

HISTORY OF OBSTETRICS.

MARRIAGE is an institution of great antiquity. Whether we take the Mosaic account of the early history of man, or refer to Mythological Chronology, we find the relation of husband and wife recognized from the first. Adam and Eve afford an instance of the first. Saturn was one of the most ancient of the gods, called *Chronos* by the Greeks, and *Saturnus* by the *Romans*. He is said to have been the son of *Uranos* and *Titæa*—the *heavens* and the *earth*, and to have possessed the government of the Universe. In this instance of Heathen Mythology, we find *Uranos*, the *heavens*, the first god; and *Titæa*, the *earth*, the first goddess. *Rhea*, the Sister of *Saturn*, became his wife. *Jupiter* and *Juno*, a Son and a daughter of *Saturn* and *Rhea*, also became husband and wife. These two deities are of interest in connexion with our subject, since *Jupiter* is represented as the father of *Apollo*, who was regarded as the god of the sciences and the arts, especially poetry, music and *Medicine*. *Æsculapius*, who was deified as the god of medicine, was said to be the son of *Apollo*, and the nymph *Coronis*. Two sons of *Æsculapius*, *Machaon* and *Podalirius*, were celebrated physicians during the age of the Trojan war. His two daughters, *Panakeia* and *Hygeia*, were no less distinguished than their renowned brothers, the latter was deified as the goddess of health. The worship of *Juno*, the third and most distinguished

wife of Jupiter, was far spread, and the number of her temples and festivals was very great. Both Greeks and Romans honored her as the protectress of marriage. Her daughters were Hebe, goddess of youth, and Ilithya, who presided over births. Thus four generations anterior to the time of Hygeia, daughter of Aesculapius, we find Ilithya, daughter of Juno, taking charge of parturient women.'

The first intimation that history affords of any especial attention being given to the parturient process, or wherein the act of child-bearing was regarded as of sufficient account to render it worthy of the presence of a presiding deity, dates at an antiquity of more than *three thousand years*. Here we find woman the presiding deity—woman with her inherent sympathies, her quick perceptions, her patience, her *natural* qualifications, was most fitted for, and worthy of this peculiar province, this high station, of presiding at the birth of the gods. And as we descend from the fabulous records of these ethereal or imaginary beings, and scan the earliest history of those of sublunary origin, we find that *birth-giving* has, among all civilized nations, been attended, if not by a presiding *deity*, a presiding genius at least, whose presence has always been regarded necessary for the safety and well-being of both mother and child.

Midwifery indicates a *woman* acting in the capacity of a mid-wife, an obstetrix, an accoucheuse; and we find from the earliest records, down to within a comparatively recent date, women alone practised in this department of the medical profession. Parturition being coeval with the existence of the race, all that was known of it previously to the use of letters, and much anterior to the discovery of the art of printing, must have been drawn from individual experience and observation, aided perhaps by tradition, a most imperfect means of transmitting knowledge from one generation to another. Old Testament history informs us that women, alone, practiced this art among the Jews, and we find the same important post assigned to them by the most refined nations of antiquity. In the brightest and most palmy days of philosophic Greece, classic Rome and imperial Carthage, woman, and woman alone presided over the duties and offices of the parturient chamber. In some few cases of extreme severity and rare danger, the aid of the physician may have been solicited. Observe, in those

early periods there were female as well as male physicians; but the presence of the male physician could be of but little service in those cases of great extremity, because of the paucity of his knowledge of the subject. The *practice* being entirely in the hands of women, experience and observation afforded no resources for him to draw from. The practice of midwifery and medicine must, alike, have been the extremes of empiricism.

Anteriorly to the time of Hippocrates, medicine was neither studied as a science, nor practiced as an independent profession. This Grecian sage lived about four hundred years before the Christian era, and to his labors in behalf of his favorite art, does the *science* of medicine owe its *origin as such*. All the accounts which have been transmitted, on the subject of medicine, from a date prior to this epoch, are either conjectural or fabulous. Posterity, by common consent, have awarded to this great philosopher the enviable title of the "Father of Physic."

He wrote the *first* treatise of which we have any account, on the subject of midwifery. This work furnished the only written guide to midwives, for nearly two thousand years, and as it was in manuscript, the presumption is, that but a comparative few who practised the art were in possession of it. But granting every midwife possessed a copy, it could have been but a very poor apology for a correct and reliable guide, as it was produced at a time when a knowledge of human anatomy consisted of but a few observations made on rudely dissected bodies, and before the science of Physiology had yet begun to dawn upon the human mind. Thus for nearly two thousand years, until after learning had been revived by the discovery of the art of printing, the art of midwifery made but very little, if any, advancement. For generation after generation, and century after century, it continued to be the same empirical routine of practice.

In those remote ages, all the recourses to art in facilitating difficult labor, were either certainl ydestructive to the child, or highly prejudicial to the safcty of the mother. When it was deemed necessary to operate on the child for the relief of the mother, no other expedient was thought of but the reduction of its size by mutilation. The crochet, the knife, and other destructive instruments were uscd for this purpose. So much less an estimate was

placed on the life of the child, (and very properly too,) than on that of the mother, that it was usually selected as the subject of the operation; but when from extreme deformity or other adverse causes, the delivery could not be thus effected, the *Cæsarian* operation was resorted to as the only forlorn hope for the safety of the mother.

The *Cæsarian* operation consists of opening the body of the woman and extracting the child therefrom, when it cannot be born through the natural passages. "Being lost, as it were, (says Velpeau,) in the night of time, the origin of this operation has not as yet been precisely ascertained by any one." In the fabulous ages, it was said that a fœtus, the son of Jupiter, was extracted from the belly of *Semele* by *Mercury*. The Romans made the same statement concerning *Æsculapius*, who was thus extracted from his mother by *Apollo*, after she had already been placed on the funeral pile destined to consume her. Virgil also says that *Lycus* came into the world in the same manner. These vague traditions, a passage in *Pliny*, and certain Roman laws, induce a belief that the *Cæsarian* operation must have been employed in the most remote ages. There is, however, no certain proof that it was performed upon a living woman anteriorly to the year 1520, unless we admit as authentic the case of the lady at *Craon*, who was subjected to the section in 1424, and who, as well as her child, survived the operation. The ancient Greek and Latin physicians make no mention of it whatever. *Guy de Chauleac*, who seems first to have described it, founding his opinion upon a passage from *Pliny*, believes that it took its name from *Julius Cæsar*; others, on the contrary, think that the general and his family took their name from the operation. We are, therefore, obliged to confess that the etymology of the *Cæsarian* operation is as ambiguous as its origin.

Rousset was the first author who dared to maintain that it may and ought to be had recourse to in the living subject. He mentions seven women who had been subjected to the operation with complete success. It is related that a woman named *Godon* was operated upon seven times, another three times. Dr. Gibson, of this city, operated twice on one woman with success, first a daughter, second a son. According to *Boudelocque*, the *Cæsarian* operation

has been successfully performed twenty-four times from 1750 up to the commencement of the present century, and perhaps in quite that number of well authenticated cases since.

Notwithstanding the success thus attending it, it is nevertheless a very dangerous operation, and should never be resorted to except as the last extremity. That it has often been unnecessarily employed, cannot be denied, in view of the many cases on record of women who have survived the operation, having had children subsequently in the natural way.

About a hundred years after the invention of type and the printing press, viz., 1540, Dr. Raynauld, of London, published the first work on midwifery ever printed in the English language. It was entitled "The Woman's Book, or the Garden of Lying-in Women and Midwives." It was originally published in Latin, and subsequently translated into several European languages. It is not at all surprising that his vanity should have become somewhat excited, and that he should have felt himself flattered by his great achievement, for he had accomplished a great work. He had published the first book in his language on a great subject, of which he knew but little, because of it but little was known. No wonder that he thought that his extraordinary production possessed magical influence, and that the mere reading of it in the parturient chamber would afford relief to the sufferer. "He enjoins that ladies and gentlemen do have this book on their hands, and that they cause such parts of it as are applicable to be read before the midwife and the rest of the women present at the labor, whereby," he says, "the laboring woman may be greatly comforted and alleviated in her travail."

Twenty-five years after the publication of Dr. Raynauld's famous book, viz.: 1665, Ambrose Parré, a French surgeon of great celebrity, issued another work, in which he advocates the operation of turning the child and delivering head foremost, or by the feet in cross-presentations, hemorrhages and convulsions. Had Ambrose Parré achieved nothing else for science and humanity but the discovery of this great expedient, it should be enough to have constituted him one of the greatest benefactors of the race; but when we add to this, the discovery of the application of the ligature, in the place of burning pitch, to staunch the hemorrhage in am-

putated limbs, and the many other brilliant achievements of his highly philosophic mind, we almost feel inclined to bow in veneration to his god-like powers—powers that were almost infinite and omnipotent to crush the hordes of persecutors who were ever crying, “crucify him, crucify him,” because of his innovations on time-honored usages, and the sublime original contributions he was continually making to the healing art. This, the operation of turning, was the first important improvement in midwifery of which we have any record since the time of Hippocrates. It was for Ambrose Parré, by the wand of his mighty genius, to break the mystic spell that held the world in darkness for two thousand years, to dispel the cloud of midnight blackness, and cause a ray of light and hope to fall upon the bed of suffering, dying woman. Honored be his name!

Ambrose Parré was possessed largely of liberality of mind—that indispensable element of true greatness. He did not disdain to instruct woman in the art of healing, and about the year 1700 the world was still further illuminated by a work written by Louiza Brewster, one of his highly-gifted pupils. This was the first undisputed work written on midwifery by a female. She wrote on sterility, abortions, fertility, child-birth, and diseases of women and new-born infants.

The next important advanced step we find taken in the science of obstetrics was the invention of the *forceps*. Although allusion is made by both Hippocrates and Galen to “instruments for the purpose of facilitating difficult labor,” they were of a kind designed merely to extract the child without reference to its life. Among the *ancient* writers on medicine and surgery, we meet with no description of any obstetrical instrument at all resembling our forceps. The first gleam of a contrivance, designed to facilitate delivery, without mutilating the foetal body, sparkles in the works of Rhazes, the Arabian, who, in the latter part of the *tenth century*, described a fillet, supposed to be adapted to this purpose. We find in Avicinna, whose work appeared nearly one hundred years after Rhazes wrote, the obstetric forceps mentioned by name, but what resemblance, if any, it bore to the forceps now in use, we have no information, further than that they were blades with teeth in them for extracting the foetal head.

The earliest trace of the modern midwifery forceps which we possess, is under the form of a secret, in the hands of an English family by the name of Chamberlain. This appears to have been a family of physicians, as we have knowledge of Dr. Chamberlain and his three sons, one of whose names was Hugh and one Peter Chamberlain, the name of the third we have been unable to learn. Dr. Hugh Chamberlain appears the most conspicuous in connection with this invention, and has been by some authors accredited with its origination, but, according to Rigby, "as to when or by whom it was first invented, this must probably remain forever unknown; at any rate there is no more reason to suppose that Dr. Hugh Chamberlain was the inventor than his father or brothers were."

The honor of inventing this instrument has been attributed to several persons; but at the present day it is clearly established that the forceps was invented by a member or members of the Chamberlain family prior to the year 1650.

One of the Chamberlains, with his imagination glowing with the prospect of sudden and great riches, repaired to Paris in the year 1670, with a view of selling his secret, but failing to accomplish delivery in a case of extreme deformity of pelvis, which he conceived his instrument capable of doing, he failed in getting the *ten thousand* crowns for his secret, which he was to have had of the king's chief physician, had he succeeded, and returned to Engiand covered with disappointment and mortification. Many interesting incidents connected with this family and their invention might be given.

The next important step taken in the science of obstetrics, whether an advance or retrograde one, is a matter of dispute with many good people, was the introduction of the male obstetrician into its general practice. This occurred in the year 1663. Previously to this period, it was exclusively in the hands of women, except where surgical operations, either on the mother or child were deemed necessary. So improper was it regarded for a man to be present at an ordinary labor, and so revolting to the prejudices or tastes of the populace, that a Dr. Vites, of Hamburg, was publicly branded, or as another writer has it, was condemned to the flames, for being present on the occasion of a birth, disguised in female attire.

The distinguished individual first to make the innovation on the ancient and time-honored custom, was a no less personage than the Duchess of Villiers, a favorite mistress of Louis XIV. of France. The fortunate attendant was Julien Clement, a distinguished professor of surgery. He was conducted, in disguise and with great secrecy, into the house where the lady was, *with her head covered with a hood*. She desired the matter might be kept a profound secret. The case terminated favorably; the secret soon found its way out, and Clement was translated to the novel and lucrative office of accoucheur to the Princess of France. The same surgeon was employed in subsequent labors of the same lady, and the princesses made use of other physicians on similar occasions. It soon became fashionable, and the name of *accoucheur* was invented to signify that class of surgeons. Foreign countries soon adopted the custom and likewise the name of *accoucheur*, for they had no such term in their own language.

The next matter occurring in the order of time worthy of remark, was the discovery of the operation of *Symphyseotomy*. This consists in separating the pubic bones at the symphysis, and thereby giving amplitude to the diameters of the pelvis. Some modern physicians, from a remark by Galen, suppose this operation must have been conceived of in the remotest antiquity. Two cases are upon record of its having been performed immediately after death, for the purpose of facilitating the delivery of the children while yet alive. One of these occurred in 1766, but no one had thought of proposing the operation in the living subject until 1768, when Sigault, who, yet a student in medicine, made it the subject of a memoir, which he presented to the Academy of Surgery.

The idea of symphyseotomy, let its value be what it may, is really due to that surgeon. The renowned Academy, as is too often the case with reference to new discoveries, in organized combinations, was hardly willing to hear the first proposal of it, and Louis, who communicated it to Camper, treated it as a ridiculous project, engendered in a young man's brain, that was as yet incapable of any reflection; but not so with the celebrated Hollander, who, after performing several experiments upon the dead subject, replied to the secretary of the Academy that at some future day it might be advantageously resorted to. On his part, Sigault was

not disconcerted, and reiterated the same idea in his thesis, at the school of Angers in 1773. Four years afterward he performed his operation in the presence of Leroy, upon a woman named Supiot, and saved both mother and child. This success gave rise to an extraordinary degree of enthusiasm; the hundred tongues of fame, says Velpeau, seemed insufficient to celebrate the glory of the author of so brilliant a discovery. The faculty of medicine at Paris, thought that they could not reward him too highly by passing a solemn decree, and causing a medal to be struck in honor of him, so that the same Sigault, whom the Academy of Surgery would not deign to hear a few years before, was soon proclaimed the greatest 'benefactor of humanity, and almost equal to the gods. Such exaggeration as this soon gave rise to a lively opposition among the surgeons, and was the signal of a combat in which a great number of medical men of different countries felt themselves called upon to take part. But at the present day, when all the passions awakened on the occasion of this quarrel have become extinct, it is an easy matter to estimate the operation of symphyseotomy at its just value. It is now regarded as little other than one of the vagaries of the past, and as such, discountenanced by every intelligent obstetrician.

In the year 1760 there appeared a treatise on the "*Art of Midwifery*," by a Mrs. Elizabeth Nihell, professed midwife, setting forth its various abuses, especially in the use of instruments. It was addressed to all fathers and mothers, and those likely to be either. The avowed object of the book was to inculcate a preference of women to men in the practice of obstetrics. It is said that nothing can exceed the vehemence of her invectives against male attendants. "There is," she observes, "a curse that attends their operations, for difficult and fatal labor have never been so rife or so frequent as since their intermeddling." There can be no doubt but that her abuse was mainly directed against Smellie, Burton, Mackenzie and Hunter, as among the most extensive practitioners of midwifery in that day.

The first public lecturer on midwifery in the United States was Dr. Shippen, of this city. His first course was delivered in 1762, and it was attended by only ten pupils; but he lived to lecture to a class of two hundred and fifty.

A Dr. Atwood was the first, in the city of New York, to advertise himself a man-midwife, which he did in 1762.

In the latter part of the last century, Dr. Bard, born and educated in Europe, came to this country and established himself in practice at New York, and was elected the first President of the College of Physicians and Surgeons in the University of the State of New York. It is believed his treatise on Midwifery was the first work on the subject that was published in the country. It was designed for the use of midwives and students, and was a work of great practical usefulness. In this particular, its superiors have been but few since. But it has fallen into disrepute, on account—mainly of its greatest excellence—its bold and unsparing denunciations of the useless employment of instruments, and the reliance it places in the resources of nature.

In the introduction to the third edition of this book, after recommending some three or four authors, he says: “It may appear singular that in this enumeration of authors I have not mentioned Smellie, whose works are in the hands of almost every practitioner in this country, and more generally read than any other. But, although one of the first and greatest improvers of the art of midwifery of the last century, Smellie certainly *was not acquainted* with all the resources of nature in their full extent. Having greatly improved the instruments of his day, he has prescribed their use with great precision, and I own I am apprehensive that many of his readers may thereby be induced to suppose them equally safe in their hands as they appeared to have been in his; and hence, led to a more frequent use of them than *modern practice has found necessary or safe.*”

“I confess, not without severe regret, that towards the end of thirty years’ practice, I found much less occasion for the use of instruments than I did in the beginning, and I believe we may certainly conclude, that the person who, in proportion to the extent of his practice, meets with most frequent occasion for the use of instruments, knows least of the powers of nature, and *that he who boasts of his skill and success, in their application, is a very dangerous man.*”

These were the expressions of a great and good man a half a century ago, and they are equally applicable, nay, more so, at the present time.

Parturition—the act of bringing forth young—is a natural process, and when unaccompanied with accident, or unfavorable conditions, is without danger. As a matter of science its study is exceedingly interesting, but in point of practical utility, its investigation—a familiarization with its various stages and phenomena; the accidents and dangers that may accompany it; the length of time involved, and how it may be shortened; the amount of suffering, and how it may be relieved, &c., became matter of study of the highest importance to both mother and child.

The science of midwifery is too little understood in relation to its physiological bearing, but is regarded by most practitioners as a mere mechanical operation, to be enhanced or facilitated by tools and mechanical appliances.

Never, even in those days when primitive inventors and improvers of obstetrical instruments ran wild with enthusiasm, did the instrumental mania rage to a greater or more ruinous extent than at present.

The destroyed health, the ruined constitutions of the vast numbers of female invalids that are now dragging out wretched lives in suffering and torment, and rendering families miserable by their unceasing complainings; and the multitudes of halt and maimed, who are pining in anguish within the retirement of the private sick room, owe their sufferings mainly to the unwarrantable officiousness of those in whom they confided in the hour of nature's greatest extremity. By the specious pretext of shortening their sufferings, and through an overweening anxiety for the reputation of a skillful operator, this confidence has been most wantonly abused, and women without number ruined for life. It has been a question with many very distinguished obstetricians, whether the invention of obstetrical instruments has been a blessing or not to the sex. While they have proven themselves omnipotent to save, in cases of extreme peril, and under circumstances when both mother and child must have been overwhelmed in certain destruction, their use has been so extensively perverted to subserve the interest and enhance the sordid motives of the many operators of the past and present time, regardless of the terrible and fatal consequences to the health and well-being of the unsuspecting and too confiding victims of their knavery or ignorance, that while they are a blessing to the few they are an unmitigated curse to the many.

"Let, therefore, the young practitioner of *Midwifery* study first the symptoms and progress of natural labor as they may be found in all the standard works on the subject, and above all, as they will be seen at the bedside of the patient, when left to their own uninterrupted efforts—whence may be learned the powers and resources of nature—and when these are fully understood, *and not before*, will the practitioner be enabled to form a just opinion when interference is necessary, and recourse to art ought to be had. And let every practitioner, when supposing it necessary to practice any remedy by which the lives or safety of the mother and child are endangered, or the life of the infant necessarily sacrificed, reflect that in all such cases we reason only from strong probabilities, that the resources of nature are almost infinite, and that the event frequently disappoints our expectations. No person, therefore, who has been fatigued by several days and nights' watchful attendance, whose sympathies for the sufferings of the patient have been greatly excited, and whose fears for her safety are augmented by the fears and distress of her friends, can be sure that that cool and dispassionate judgment is at command, which alone ought to determine so intricate a question, in which the lives of two human beings are involved. It becomes a duty, therefore, on all such occasions, to call for the aid of some other in whose experience and judgment we have confidence, and whose mind is free from the embarrassments under which our own labors, and who, at all events, will share our responsibilities and lessen our regrets."—BARD.

This branch of medical science has struggled against far greater difficulties than have beset the general practice of medicine and surgery, for both ignorance and prejudice have lent their aid towards retarding its progress. The functions of the procreative organism of the human female being so essentially different in their manifestations from those of any of the lower animals, the opportunity of studying them comparatively by vivisections have been but few, and of but little value. It has been by immense labor and a long course of physiological research, coming down from generation to generation from the remotest antiquity, that we have arrived at our present knowledge of the science of woman. This reign of ignorance has been sustained and perpetuated by the

natural prejudices that females themselves *must* entertain against admitting persons of the opposite sex to undertake the duties required under the trying time of labor, and from the repugnance they have to communicate with man in relation to the phenomena of their peculiar functions, either in health or disease.

So little was known of the science of midwifery, and so poorly was its importance appreciated, previously to the commencement of the present century, that but few, if any, of the Universities of Europe had enrolled it among their obligatory studies, and it was not until after the year 1826 that the British schools adopted the measure. An association, entitled "The Obstetric Society of London," of which Dr. Francis H. Ramsbotham acted as Honorary Secretary, and which had the influence of Sir Robert Peel and many other distinguished individuals, did much to elevate obstetrics in that kingdom. They induced the Royal College of Physicians and the Society of Apothecaries, not only to make obstetric science the subject of examination, but to oblige all candidates who offered themselves for their diplomas, to adduce testimonials of having diligently applied themselves to its study. The Royal College of Surgeons now grants a special diploma, namely, that of Licentiate of Midwifery, to such candidates as successfully pass their examinations upon that branch.

In the Medical Department of the University of Pennsylvania, which was commenced on the 3d of May, 1765, midwifery does not appear as a branch of study until 1791, during which year midwifery was united to the chair of anatomy and surgery, under the professorship of Dr. William Shippen. It remained in that connexion, as a mere subordinate branch, until the year 1810, when it was elevated to the dignity of a distinct professorship, and Dr. Thomas C. James was elected to the chair, which position he retained until 1834, when he retired on account of feeble health. For some years previously to his retirement, the active duties of the chair were performed by Dr. William P. Dewees, who was adjunct professor. I shall ever cherish the remembrance of the venerable appearance of that excellent old man as he entered the lecture room for the last time in 1832, supported by two of his colleagues, Drs. Chapman and Gibson; his long locks were whitened

by the frosts of eighty winters ; his nearly exhausted frame was trembling and bending under a weight of years devoted to science and humanity ; he was seated in a chair, and in a low and feeble voice addressed the class on the vast importance of that branch of the profession to which his long life had been devoted ; he spoke with all the tenderness of a father addressing his children for the last time, and there was not a student present but who felt that it was good for him to be there, and the emotions created upon that occasion will remain indelibly fixed upon the minds of all during life.

Thus, for more than half a century, was midwifery regarded as an inferior branch in the oldest and most honorable medical school on the American continent, and during one half of that period it was not considered worthy of a place among the catalogue of studies.

At the present time there is no branch connected with a sound medical education, that occupies a higher position in the catalogue of obligatory studies than obstetrics. And during the present century, there has been more attention given to, and more labor bestowed upon it, in Europe, than has been devoted to any other branch of medical science, and with the most brilliant results.

Notwithstanding the great advancements that have been made, the subject demands, and there is room for, still further investigation and more progress.

FRONTISPIECE.

WOMAN.

Gynæcology, the science of woman, embraces the anatomical structures and relations of the genital system, its physiological and pathological conditions; ovology, or embryology, the function of parturition, and all the phenomena pertaining to it; and the treatment of those diseases and derangements incident to the sex.

Woman is liable to most of the diseases to which man is subject, while she is also the frequent victim of a train of distressing and painful maladies, from which he must always remain exempt from the very nature of his organization. Unfortunately for suffering woman, the importance of this department of medical science is too lowly estimated, or not sufficiently regarded, by the general practitioner of medicine. Medical schools do not seem to have a full appreciation of the vastness of the subject, in view of its relation to the physical and mental welfare of the race, or they could not be content to pass it over with so superficial a course of instruction as they generally bestow upon it. While we are fully aware of the difficulties under which medical schools labor, in being able to thoroughly elucidate all the branches they undertake to teach, in the short time they devote to instruction, we cannot hold them excusable for not impressing upon their classes the great magnitude of this department, and the necessity of the close and persistent study of it after the period of their pupilage shall have expired, and they become engaged in the active duties of professional life,

when every day's experience will reveal to them the necessity of a more thorough acquaintance with the subject, to enable them to acquit themselves with more satisfaction and credit to themselves, and benefit to their patients. All the knowledge that can be acquired by a few months' attendance upon lectures, is but a pitiable apology for that proficiency which is indispensable to success in the treatment of invalid women. But this knowledge, though merely rudimental, is requisite for the basis of future success ; and without it, it is impossible to get a clear comprehension of the physiological relations and vast pathological sympathies existing between the reproductive organism and the general economy.

In contemplating gynæcology, we find ourselves surrounded by a subject replete with the highest interest, and greatest physiological and pathological importance,—one vast in magnitude, and beautiful in its adaptations to the ends in view.

Woman may be regarded, in one sense, as a twofold being, possessing a compound system—the general and the genital—distinct in their characters, their purposes, and their ends ; the one essential to individual existence, and the other destined only for the reproductive functions ; the latter being in nowise concerned in contributing to the vital continuance of the individual, while the former is indispensable to the existence and development of the latter, and to the continuance of animal life.

In contemplating the vast universe with which we are surrounded, and of which we form an integral part, we see much to admire and reverence ; but the grand and gorgeous developments of creative power, with all their magnificence, beauty, and harmony, are not comparable, in design and fitness, with the wonderful arrangement destined for the reproduction of *man*, the crowning workmanship of Deity as manifested in *woman*.

As man is superior to all the orders of nature—so, also, this organism, by means of which his existence becomes individualized, and upon which the perpetuity of his race depends, is of the highest possible consequence, evincing an indefinite degree of creative skill.

The first organs in the assemblage, and those upon which the pro-creative function mainly depends, that most especially claim the attention of the student, are two in number, called the ovaries, or

ovaria, situated about two inches from the uterus, on each side, and entirely disconnected from the cavity thereof. These little bodies, in shape not unlike a flattened almond, are for thirty years of woman's life, constantly generating, maturing, and every twenty-eight days, casting off ova, or eggs, not larger than those of the butterfly, containing all the essential elements of the eggs of oviparous animals. The maturation and escape of the ovum constitutes the menstrual function—a function that perplexed philosophers to comprehend until a very recent date. Though modern science has thrown much light upon this wonderful provision, yet there remains much for farther study.

The tubes of Fallopius, next in importance in the reproductive process, stand like sentinels, guarding the functions of the ovaria, and with their fimbriæ, that float loosely in the abdominal cavity, seize the ova as they escape, and transfer them to the cavity of the uterus, whence they are carried off, unperceived. But the ovum, impregnated, does not thus escape; it passes into its receptacle, and by another wonderful provision is there retained until expelled by the powerfully expulsive contractions, at the full period of utero-gestation.

The uterus, matrix, or womb, the next organ in importance, is a hollow muscle, about two and a half inches in length, one and a quarter in width, and three-fourths of an inch in thickness, in shape resembling a flattened pear, situated in the cavity of the pelvis, is destined to receive the fecundated ovum, to nourish, and finally expel the foetus; its walls are of a firm, thick, and dense structure, susceptible of a vast degree of expansion, and possessing immense strength. This property is almost self-existent, and incredible in degree, capable of overcoming almost any amount of resistance afforded by a disproportion and deformity of the maternal bony structures.

This wonderful organ, its anatomical position, structure, and relations; its physiological functions, both in quiescence and activity; its pathological conditions, both functional and organic, is of the utmost importance to study and thoroughly comprehend. This, together with the first two organs named, will be found to exert a greater control over the female system than any other apparatus belonging to the economy. The ten thousand aches and

pains, whether constitutional or local, that harass the lives of very many women, are traceable, either immediately or remotely, by the intelligent and observing physician, to ovarian or uterine disturbances.

The physiological influence exerted over the economy by the development of the genitalia, at puberty, is truly interesting and wonderful, affording a theme for deep study and reflection. If we go back, in our observations, to the first periods of gestation, we will find great difficulty in ascertaining to which sex the embryo belongs, the male or the female, presenting as it does no external marks of distinction, the external organs bearing so strong a resemblance to each other, that the difficulty of distinguishing the sex becomes insurmountable. As the development progresses, early in foetal life, this difficulty subsides, and the distinguishing marks become more and more apparent, until we arrive at a full knowledge of the fact. But, during foetal life, no appreciable physiological difference exists between the male and female; and, during the periods of infancy and childhood, this sameness continues; their physical growth and mental development are the same; their natural habits, sports, and attainments, uninfluenced by educational training are the same; the diseases to which they are liable are the same, and the remedial treatment and required hygienic care are identical. This physiological oneness continues, with but very little deviation, until the period of puberty arrives, when the female commences a wide separation from her pristine physiological condition.

This period, which, in this latitude, occurs about the fourteenth year, is marked by great and almost incredible changes, in every particular. Now commences the regular monthly, or catamenial flow;—at first, when perfectly natural, small in quantity, and faint in color,—but after two or three apparently abortive periods, the function becomes fully established, which continues, when uninterrupted by pregnancy, lactation, or other influences, in the aggregate, for thirty years of woman's life. With this function commences a complete metamorphosis of the whole being. The sharpness, angularity, and awkwardness that characterize the period of childhood, are changed into rotundity, symmetry, and grace. Every portion of the body undergoes a marked and decided

ehange. The limbs beeome developed, round, and symmetrical; the neek and shoulders assume a form of gracefulness and beauty; the swelling bosom, gracefully aseending and descending with every breath, gives additional physical interest and attractions to the object of our admiration and study. The whole trunk sympathizes in the universal change, and takes on a fuller development, with exact proportions, and perfect adaptations. The vagina, also, becomes enlarged in its caliber; and by the enlargement of its numerous muciferous glands, is freely lubricated, and prepared for its legitimate use. The other internal genital organs also freely participate in the general transformation, and become enlarged, and aroused from their primitive quiescence, to perpetual activity, and the performance of the various functions for which they were designed.

The physical changes that take place in the face, are equally distinct with those of the other parts of the body. A roundness and fulness are given to all the features, which impart proportion and beauty not possessed before; the lips become more prominent, and more deeply tinged with red; the cheeks become round and full, and by the rising blush, easily betray the emotions within; and the eye, the unmistakable index of the soul, possesses a softness, lustre, and expression, before unknown to it.

The interior being is no less affected by the changes peculiar to this interesting period of life, than is the external organization.

The habits, disposition, and condition of mind all undergo corresponding changes. The trivial and senseless diversions of the child, give way to more rational and substantial amusements. Companionship with children ceases, and associations are formed with those of maturer age. That child-like confidence, that allowed a free, innocent, and unrestrained commingling of the sexes in their joyous pastimes, gives way to a shyness and modesty that were before unknown; associations with the opposite sex are now only maintained in accordance with the set rules and fixed laws of society. Sensations, feelings, and thoughts, are now entertained by her in regard to the man, that were never experienced in reference to the boy. The mind now develops much more rapidly; the individual becomes more pensive, more staid; a higher order of enjoyments is craved. Her reading becomes of a

different order; the toy-book gives way to works of science, history, or the delineations of character. Real friendships and attachments are formed, the affections become developed; and, in a word, the child is transformed into the woman. And the time required to complete the transformation is incredibly short.

A person leaving a neighborhood, village, or circle of acquaintances for a season, and returning after a lapse of a few months only, will be astonished to find her, whom he left, the laughing romping, confiding child, transformed into the thoughtful, modest retiring young lady. But such is the rapid and thorough change that is effected through the whole economy, simultaneously with the normal development of the genital system.

From what has been said, it will be perceived that there exists between the genital and general systems the most extensive sympathies, the source and centre of which are the ovaries. These sympathies exist no less in a state of disease, than in health; and any lesion of the latter pervades the whole economy, as exemplified in the constitutional disturbances arising from menstrual irregularities, &c.

The *uterus* may be extensively involved in disease, or inhabited by morbid growths, without producing a corresponding amount of constitutional symptoms, save where debilitating discharges are present. In view, then, of the extensive sympathetic relations existing between the ovaries and every part of the animal organism, too much study cannot be bestowed upon this system, in order to arrive at a correct diagnosis, and the application of proper and efficient curative agencies.

Ovology, or embryology, that science which treats of the development of foetal life, and the growth of the embryotic being, is full of interest to the naturalist, presenting, as it does, an extensive field for observation and inquiry. Commencing our researches low down in the vegetable kingdom, we readily discover the law that governs the reproductive functions there; and as we proceed along the scale of development, ascending step by step, through the floral, and from thence through the various families of the animal kingdom, to the *genus homo*, we will perceive the same great law pervading the whole, but manifesting itself in various ways, according to the different habits and requirements of the subjects of its operations.

The study of gestation, and its effects upon the future of the embryotic being, in regard both to its physical and mental welfare, has been too shamefully neglected by the profession, and left to be pursued by philanthropists, outside its pale, who, for want of correct rudimental knowledge, and a strictly scientific basis for their inquiries and researches, have been led into many errors, and vague hypothetical speculations, which tend to mislead, rather than instruct the mind. This subject invites and requires a more thorough investigation than has yet been bestowed upon it, which it is desirable, for the benefit of the race, will not be much longer delayed. From the few hints that have been here thrown out, it will be perceived that the study of woman is not merely the work of a few weeks or months, but one in which a lifetime may be profitably employed.

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PART FIRST.

CHAPTER I.

THE PELVIS.

The Pelvis (from the Greek *ῷσλυς pelvis* a basin; because its shape resembles a basin used by the ancients). It is that bony structure or frame-work at the inferior portion of the trunk, a part of which it forms. It articulates with the last lumbar vertebra, at its upper and posterior border—and with the heads of the ossa femora, in the acetabula.

In the adult it is composed of four bones, but in the foetus, and in early life, of many more. All four of the pelvic bones of the adult, were composed, originally of several parts each, which primitively were separated by cartilaginous septa; but as life advances, the parts belonging to each, gradually become consolidated, by the ossification of the cartilaginous matter, into the following individual bones, viz.: Two ossa innominata, os sacrum and os coccygis, each of which presents points of study important and interesting to the student of obstetrics.

SECTION I.—OF THE BONES OF THE PELVIS.

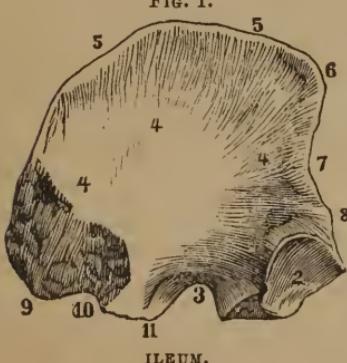
We shall first describe the 1, os innominatum, one of the two bones that form the sides of the pelvis, and which articulate with the os sacrum, posteriorly, and with each other anteriorly. It is also called *os coxarium* (from *coxa*, the hip). It is called innominatum because the three bones, of which it was originally formed, grew together and formed one bone, which was then left nameless.

(Hooper). It is a large irregular bone, divided into three portions viz.: the Iliac, Ischiatic and Pubic, which are usually described as three distinct bones.

It is usual with writers on Obstetrical Anatomy, in describing the bones of the pelvis, to commence with the sacrum and coccyx, and conclude with the innominatum. This order is here reversed, because the latter bone is the largest one in the assemblage, constituting, with its fellow, fully four-fifths of the organ, and presenting many other interesting points for study. It is deemed proper, therefore, to assign it the position to which its importance entitles it.

2. *The Iliac portion, or os Ileum* (from *ilia* the small intestines: so named because it supports the ilia). It is also called the haunch-bone. It is the superior portion of the os innominatum, and much the largest of the three composing it.

FIG. 1.



The Ileum, Fig. 1, is divided into body, neck, ala or wing, and crest or spine. The body, 1, is the thickest part of the bone and forms its base; it contributes rather more than one-third to the formation of the acetabulum, 2 from *acetum*, vinegar; so called because it resembles the *acetabulum*, or old saucer in which vinegar was held for the use of the table, a name given, by the Latin writers, to

the cup-like cavity of the os innominatum, which receives the head of the thigh bone.

Immediately above the body there is a depression, formed mainly by the iliac portion of the great sciatic notch, 3, which is termed the neck of the bone.

Rising up from the neck, and spreading out anteriorly and posteriorly, there is a broad sheet of bone called the ala or wing, 4, 4, the superior border of which is known as the crest or spine of the ileum, which in the recent state is tipped with cartilage, 5, 5, 5. The crest terminates in four processes called spinous processes. They are the anterior superior spinous processes, 6. Immediately inferior to which there is a depression, 7, which helps to

form the neck; below this again, we have another process known as the anterior inferior spinous process, 8. Posteriorly we have a similar termination, the posterior superior spinous process, 9, then depression, 10, and finally the posterior inferior spinous process, 11.

The superior border or crest of the ileum is thicker than the other portions of the ala, it is concave on its internal surface and inclines outwardly, except the posterior third, which looks rather inwardly, giving it a twisted appearance, which has been compared to the letter S, in shape.

The bone presents two surfaces, the internal and the external; the internal surface is concave and smooth, the concavity is called the fossa of the ileum and affords a bed for the iliacus internus muscle; the posterior surface which is presented in the annexed cut, is called the dorsum of the ileum, and is rough and uneven. Anatomists have described three curved lines, the spaces above and between these are slightly concave and give attachment to the gluteus maximus, gluteus medius and gluteus minimus muscles. This external or femoral surface has been called the *external iliac fossa*.

3. *The Ischium* (from Greek *ισχιος*, the loin; so named because it is near the loin).

The Ischiatic portion, or Os Ischium, also called os sedentarium, or seat-bone is next in size to the ileum, and constitutes the most inferior portion of the innominate. It consists of a body, neck, tuberosity and ramus. The body is the thick part of the bone; and like the ileum contributes rather more than one-third to the formation of the acetabulum, 2. Inferior to the body is a depression extending about two-thirds around the bone which is called the neck, 3. Jutting out from the posterior lateral portion of the neck is a sharp, lance-shaped spike of bone, called the spinous process of the ischium, of which more will be said hereafter. That portion below the neck is the tuber or tuberosity of the ischium, 4. It is a large strong structure, and supports the body when in a sitting position. Its most inferior border, 5, is very rough and uneven, and gives attachment to the long faciculus of the sacro sciatic ligament and ori-

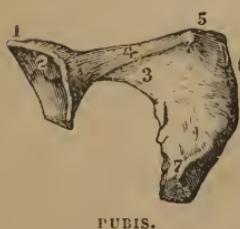
FIG. 2.



gin to the semi-membranosis, semi-tendinosis, the long head of the biceps flexor cruris and quadratus femoris muscles. From the tuberosity we have the ascending ramus, 6, to meet the descending ramus of the pubis. The bone is smooth internally, and the external surface, which is presented in the cut, is rough for the attachment of muscles.

4. *The Pubes*, pronounced pūbes (from *pubēre*, to begin to be covered with hair).

FIG. 3.



The pubic portion or *os pubis*, called formerly *picten* from its resemblance to the ploughshare, is the smallest of the three constituting the innominatum. It forms the anterior portion of the bone, and is divided into body, neck and two rami. The body is the thickest part of the bone, 1; and contributes rather less than one-third to the acetabulum,

2. The horizontal ramus, 3, extends from the body towards its fellow on the opposite side, with which it forms the symphysis (from *συν*, *syn*, together, and *φύω*, *phyo*, to grow,) along the interior edge of the superior margin extends a sharp ridge slightly elevated, called the spine of the pubis, 4, which terminates in a small protuberance known as the spinous process of the pubis, 5. The outer extremity of the horizontal ramus is flattened out, and furnishes the rough articulating surface, 6, with which it unites with a similar arrangement of the *os pubis* of the other side. From this flattened portion we have extending downwards the descending ramus, 7, to meet the ramus of the ischium. The bone is smooth within and rough without.

5. THE INNOMINATUM ENTIRE.

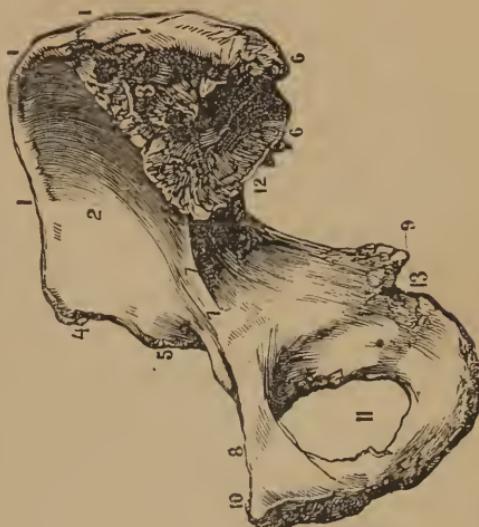
Having studied the three portions of the bone in detail, we are now prepared to examine it as a whole. Its general shape has been compared to the figure 8, being comparatively narrow in the middle, and broader at the two extremities. Its twisted shape gives it an awkward and irregular appearance. The interior surface is represented in fig. 4. 1, 1, 1, represents the crest of the ileum, to different parts of which are attached the oblique, and transversalis abdominis muscles, the latissimus dorsi, the erector spinae, and the quadratus lumborum. The interior face of the ileum

presents two surfaces, one smooth and concave, the fossa, 2; the other rough and irregular, 3, for its articulation with the sacrum. To the anterior superior spinous process, 4, is attached one extremity of Poupart's ligament, the tensor vaginae femoris, and the Sartorius muscles. The inferior anterior spinous process, 5, gives origin to the longer portion of the rectus femoris. The posterior spinous processes, 6, 6, afford attachment to strong ligaments that assist in binding the ileum and sacrum firmly together. From the margin of the rough articular surface of the ileum, there extends a line called the linea ilica, 7, 7, which, united with the spine of the pubes, 8, constitutes the *linea ilio-pectinea*; this, with its fellow on the opposite side, forms the brim of the pelvis, or the superior strait. The spinous process of the ischium, 9, gives attachment to the short faciculus of the sacro-sciatic or sacro-ischiatic ligament; and origin to the coccygeus muscle. This process inclines inwardly and when preternaturally long, which is sometimes the case, it constitutes a deformity of a very grave character, shortening the transverse diameter of the inferior strait or outlet, to so great an extent as to seriously interfere with, if not entirely to obstruct, the passage of the child's head.

The spinous process of the pubes, 10, gives attachment to a portion of Gimbernat's ligament.

When the ischium and pubes are united together there is formed a large oval opening, which has received various names as the *foramen ovale*, the *thyroid* and *obturator foramen*, 11. This aperture, in the recent subject, is covered almost entirely by a membranous expansion called the obturator ligament. It con-

FIG. 4.



INNOMINATUM.

sists of the external and internal periosteum, extending over the opening, leaving a very small aperture at the upper portion, through which are transmitted the obturator artery and nerve. Nature, ever prodigal in her dispensations of what is really needful, is equally economical in reference to superfluities. The absence of bony matter in this large opening contributes to the lightness of the bone, without impairing its strength; its presence there, would therefore be superfluous. The membranous expansion, which covers it, answers all the purposes of bony matter, it gives origin to the obturator internus muscle internally, and to the obturator externus, externally.

The great sciatic notch, 12, is converted into a large foramen by the sciatic ligament, the lesser sciatic notch, 13, by the long faciculus of the same ligament is converted into a smaller foramen. Through the former pass the great sciatic and pudic nerves, the gluteal, sciatic and pudic arteries, and the tendon of the pyriform muscle. Through the latter the pudic artery and nerve re-enter the pelvis, and the obturator muscle passes out.

6. THE OS SACRUM OR OS BASILARE.

The Sacrum (from *sacer*, sacred, because it was formerly offered in sacrifices, or perhaps from its supporting the organs of generation, which were considered by the ancients as sacred). It is sometimes called the false vertebra.

FIGS. 5. AND 6.



SACRUM AND COCCYX.

The sacrum is a triangular bone, with its base above and apex below; it is concave and smooth internally and convex and rough externally. There is a canal that runs nearly the whole length of the bone, which in the recent subject contains that portion of the spinal cord, termed the cauda equina, so called from its resemblance to a horse's tail. The bone presents five pairs of holes, 1, 1, 1, 1, 1, the fifth is sometimes absent, or mere notches, both upon its internal and external surfaces represent them. The former transmit nervous filament to

supply the pelvic viscera, and form part of the great sciatic nerve, and the latter to supply parts external to the pelvis. In foetal, and early life this bone consists of five parts, the interosseous spaces being occupied by cartilage, which in after life becomes ossified, connecting the five bones into one. The spaces formerly occupied by the cartilaginous deposits are well marked by five white lines, 2, 2, 2, 2, 2, which run traversely across the bone between each pair of holes. The concavity is called the hollow of the sacrum, and the prominence at the inner edge of the superior border, is called the promontory. On the superior margin is the articulating surface, 3, where the sacrum articulates with the last lumbar vertebra; the inferior extremity is marked with a similar surface, 5, by which it articulates with the coccyx. On the upper border, we also have two prominences, 6, 6, each presenting an articulating surface posteriorly, that articulates with similar processes of the vertebra, to which they are attached. The external or convex surface is very rough and irregular. On the median line of the bone are three or four rudimental spinous processes, answering to the spinous processes of the vertebræ. On each side of the upper portion of the bone is a large irregular surface, marked by elevations and depressions, for articulating with similar surfaces of the innominata. About an inch and a quarter from the coccyal extremity of the bone, the canal terminates by the absence of its outer boundary, in a well marked groove, at the inferior extremity of which is on each side a hook-like process, called the cornua of the sacrum.

The sacrum is the lightest bone in the body, in proportion to its size, its structure being very loose and spongy. It is situated in the back part of the pelvis, and forms its posterior walls. Its inclination, in the standing position is downwards and backwards, while its superior border looks upwards and forwards. Its position in the pelvis might be compared to that of a double keystone supporting two arches. The promontory of the sacrum with the two or three last lumbar vertebræ, from the sacral angle. This angle extending too far over the cavity, shortens proportionably the antero diameter, and constitutes one of the most frequent deformities met with in practice. The bone at this point supports the entire weight of the trunk, head and superior extremities, and any softening of it, or the vertebræ connected with it, from disease, du-

ring childhood or youth, or from other causes, would almost certainly result in said deformity.

7. THE OS COCCYGIS OR OS COCCYX.

The os coccygis, Fig. 6, (from *κοκκυξ*, *kokkyx*, cuckoo, because it is said to resemble the bill of that bird; it has also been called the *caudal vertebra*, from *cadō*, to fall, because it falls down from behind—a tail). It is a tail-like appendage attached to the inferior point of the sacrum. It inclines inwardly and thereby completes the curvature of that bone. In foetal and early life it consists of cartilage only, but as life advances points of ossification are gradually developed, and *three small bones*, sometimes four, are formed, which, like those of the primitive sacrums, are separated by cartilaginous layers, which at maturity also become ossified, when the formation of the bone is completed. It is conical in shape, with its base, 1, attached to the point of the sacrum by a movable joint. The length of the bone is about one inch and a quarter, and would shorten the antero-posterior diameter of the inferior strait to that extent, did not its mobility admit of its being pressed backward by the child's head in its passage through that strait. Transversely across the bone are observed three slightly elevated lines, 2, 2, 2, which mark the spaces previously occupied by the cartilages. On the posterior margin of the base of the bone are two well defined elevations, 3, 3, called the cornua of the coccyx. It is concave and smooth internally and convex and rough externally. In the ordinary and undisturbed condition of the bone its point inclines forwards, and affords support to the lower end of the rectum. It affords insertion for the coccygeus muscle, throughout nearly the whole extent of its lateral margin.

Diminutive in size and humble in its position, this bone is of greater importance, in an obstetrical point of view, than might be imagined, from its insignificance and station. It not unfrequently becomes ankylosed to the sacrum, and its mobility destroyed. In that case it presents a very serious obstacle to the escape of the child's head through the outlet. This consolidation of the two bones into one, usually occurs earlier in males than females. In the former it has been known to exist at twenty-five years of age, but occasioning no inconvenience. In the latter it does not often take place before the thirtieth year. Those more particularly liable

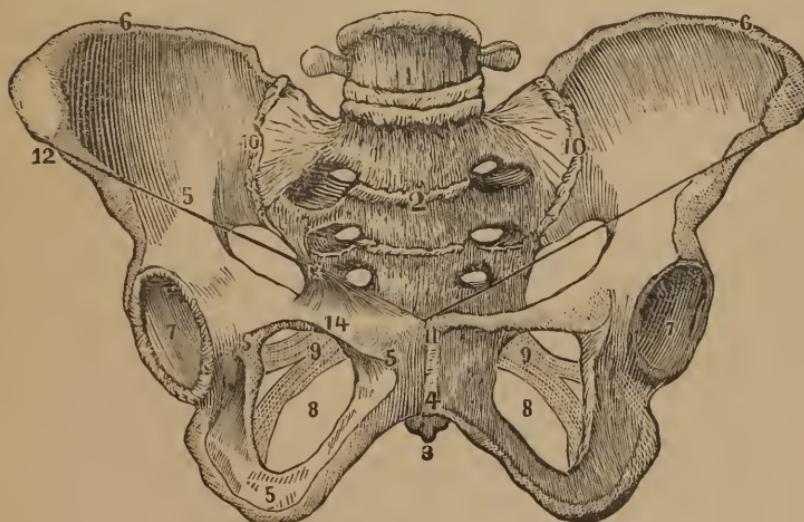
to it are they who are accustomed to sedentary lives—as milliners, seamstresses, &c. If such postpone the matrimonial relations to that time of life, they incur a great risk of having serious difficulty in their first confinements.

SECTION II.—THE ARTICULATED PELVIS.

Having studied the four bones constituting the pelvis, separately and in detail, we are now ready to put them together, and out of our prepared material, construct the framework of the edifice, destined to lodge and protect, those organs, whose exalted functions are the reproduction of the human race.

The points of study presented in contemplating the articulated healthy pelvis are; 1, Its mode and means of articulation; 2, Its divisions and straits; 3, Its diameters and proportions; 4, Its axes and their relations. A complete familiarity with the anatomy of the pelvis, is as essential to a well instructed obstetrician, as is the alphabet to the accomplished linguist. A patient and thorough study of it, then, in all its details, as the basis of future inquiry, is of the greatest importance.

FIG. 7.



ARTICULATED PELVIS.

The annexed cut, Fig. 7, represents the articulated pelvis, viewed from the front, *in situ*, in the skeleton. The last lumbar vertebra, 1, remains attached to the upper border of the sacrum, with a view of showing the connection of the latter with the spinal column. The

sacrum, 2, retains in view three pairs of holes and three white transverse lines, the remaining two of each, being concealed by the pubis anteriorly. The point of the coccyx, 3, is seen peeping from behind under the arch of the pubis, 4, the innominata, 5, 5, 5, one on each side show the crest of the ilia, 6, 6; the acetabula, 7, 7, the foramina ovale 8, 8, and the sacro-sciatic ligament, with its two facicula, 9, 9. The line of junction between the sacrum and the innominata is called the sacro-iliac symphysis or synchondrosis and sometimes the sacro-iliac junction, 10, 10. The line of union between the pubic bones is known as the symphysis pubis, 11, and immediately below the symphysis is that broad arch-like excavation, designated the arch of the pubis, 4. The acetabulum, 7, is formed, as has been already intimated, by the union of the ileum, ischium and pubis, each of which separately is composed of a portion of it, and which must unite in, and form that cavity.

Now how is this connection, and the relative position of the several bones of the pelvis, maintained? This is a question not to be disregarded, as there is a great amount of popular ignorance in reference to it. Are they all ankylosed together, as are the primitive bones of the sacrum and innominatum? Or are they united by movable joints like the sacrum and coccyx? Neither of these conditions pertain to the sacro-iliac synchondrosis or symphysis pubis; but they are held in proximity by strong ligamentous bands.

The innominata and sacrum do not meet, but are kept separated by a layer of fibro-cartilaginous matter, similar to that found between the vertebræ, in the spinal column. The fibro-cartilaginous layer found in the sacro-iliac synchondrosis is much thicker on its external margin. From this thick margin it gradually becomes thinner and thinner as it advances internally, like the blade of a knife, until it terminates in a very sharp edge at the internal line. A like layer is also found at the symphysis pubis, but it is of a more uniform thickness. It here sometimes projects inwardly to the extent of a quarter of an inch, or more, presenting a tolerably hard, resisting ridge, which shortens the antero-posterior diameter to that extent, and interferes proportionably with the easy passage of the child's head during labor. It is said by some Anatomists that the pubic articulation is supplied with a rudimental synovial membrane, and a small quantity of fluid resem-

bling synovia. There is said also to exist in the sacro-iliac articulations a thick yellowish fluid in very small quantities, which lubricates them, and is more abundant in early life. The presence of these fibro-cartilaginous layers in the pelvic articulations serve to protect the bones against the influence of falls or blows; they being of a softer and more yielding texture than the bones arrest the concussion at the joints, and confine its effects, alone to the bone receiving the injury.

1. THE LIGAMENTS OF THE PELVIS.

As has already been observed, the bones of the pelvis are held together by very strong ligaments, which pass from one bone to another, and hold them firmly and immovably together. Some of the more important of these it is deemed proper to mention, while a full detail of the small ones will be reserved for the demonstrations of the Anatomist.

2. OF THE SACRO-ILIAC ARTICULATION,

1. *The Ligamentum Sacro Spinosum.* This ligament is a very strong, flat, long and perpendicular one, which arises from the posterior superior spinous process of the ileum, and is inserted into the third and fourth transverse process of the sacrum.

2. *The Sacro-Iliac Ligament.* This ligament lies next to the articular surface of the bones. It is by some Anatomists regarded as two ligaments, one of which is anterior and the other posterior. Horner and others describe it as one surrounding the joint. It is particularly strong on its posterior face. On the front of the joint it is uniform, and consists of a plane of short, strong fibres, passing from the margin of one bone to that of the other. It is very thin so as to occupy as little space as possible. On the posterior surface it is much more irregular, and arises from the edge of the sacrum, and is inserted into the rough surface of the ileum, immediately behind its articular face; it fills up there a considerable space between the sacrum and ileum, and from its position is extremely irregular. Its strength is so great, that in forcing the joint, the ligament does not rupture, but separates rather, from the surface of the ileum, and sometimes brings with it a lamella of bone.

3. *The Sacro-Sciatic Ligament.* This ligament is often described as two, and perhaps anatomical exactness would justify such a de-

scription. Anatomists may be interested in settling such questions of mooted precision, but the Obstetrician prefers to study his branch in reference to its practical utility. What does it signify to him whether the sacro-sciatic ligament is composed of two layers so closely blended together as to be inseparable, or of only one. It is enough for him to know that the part presented is an important one, with which it is his business to become familiar in relation to its practical bearing.

This ligament arises from the posterior inferior spinous process of the ileum, along the entire margin of the sacrum, below the synchondrosis; and from the first bone of the coccyx, by a broad, fan-like aponeurosis, its fibres converge, its body growing more and more narrow, until it bifurcates into two faciculi, one (the shorter) of which is inserted into the spinous process of the ischium, and the other passes on to be inserted into the bony ridge along the internal margin of the tuberosity of the ischium. This is also a very strong ligament, and contributes mainly to fasten the bones at the inferior strait.

3. THE PUBIC ARTICULATION.

The articulation of the pubes is formed between the bodies of the ossa pubes, by the aid of two ligaments.

4. *The Anterior Pubic Ligament* is not very distinct. It lies in front of the symphysis, and consists of a few oblique and transverse fibres passing from one bone to the other.

5. *The Inter Pubic Ligament*, occupies the summit of the arch of the pubes. It is triangular in shape, about half an inch in breadth, and passes from the margin of one of the descending rami of the pubes, to a corresponding line on the other. It is remarkably strong, and holds the bones together at this point.

6. *The Obturator Ligament* was fully described in connection with the innominatum.

4. THE SACRO COCCYGEAL ARTICULATION.

The sacrum and coccyx are united by a fibro-cartilaginous substance, resembling that between the bodies of the true vertebra, and also two ligaments.

1. *The Anterior Coccygeal Ligament* is placed on the fore part of the latter bone, runs its whole length, and arises from the inferior extremity of the sacrum.

2. *The Posterior Coccygeal Ligament*, as its name implies, is placed on the back part of the coccyx. It arises from the inferior margin of the spinal canal in the sacrum, and forms a sort of membranous expansion which passes the first bone of the coccyx and is inserted into the second. There are also a few other ligamentous fibres connecting the bones.

Poupart's and Gimbernat's Ligaments. Figs. 7, 11, 12, 13, 14. Poupart's ligament is constituted of a portion of the tendon of the external oblique muscle. It may be said to arise from the anterior superior spinous process of the ileum, and as it approaches the pubes from its origin, it slits so as to leave an aperture for the passage of the round ligament of the uterus in the female, and the spermatic cord in the male. This opening obtains the name of the external abdominal ring. That portion of the tendon forming Poupart's ligament, and which constitutes the upper border of the ring is inserted about the symphysis pubes and partly into the bone on the opposite side. The portion of the tendon forming the lower boundary is inserted into the spinous process of the pubis, and for an inch along the spine of the bone. This portion is called Gimbernat's ligament, after a distinguished French surgeon, who was the first to describe it.*

SECTION III.—OF THE MOBILITY OF THE BONES OF THE PELVIS.

Some anatomists aver that the bones of the pelvis are susceptible of more or less motion, and admit of a degree of separation at the time of child-birth. This averment has given rise to a great popular error in non-professional minds, and no doubt from previous teachings, many in the profession entertain similar notions. In review of the character of the pelvic articulations it would be difficult to conceive of the possibility of the least amount of motion or separation of these bones, without inflicting a corresponding amount of injury, even admitting the ability of the ligaments to stretch sufficiently to allow a separation to a given extent. This could not be done without separating the bones from the fibro-cartilaginous matter, with which these joints are supplied, to the extent of the separation; and this could not be done with-

* Homer's Anatomy.

out lacerating the organized tissues, and tearing up the adhesions, by which they are united, and this unavoidable injury would be followed by inflammation, if not suppuration and its consequences. This structure, located as it is near the centre of the body bearing the entire weight of the trunk, head and upper extremities, upon its upper border, and poised upon two points, viz., the acetabula below, the greatest amount of firmness and steadiness are required, to insure free and easy locomotion. The unsteady and loose condition of the bones, that would be necessarily the consequence of mobility or separation, would render the organ useless, and the person thus circumstanced a cripple for life, especially if the injury were repeated at any subsequent confinement. It is difficult to imagine a greater calamity that could befall a woman, than to be a victim of such a misfortune.

There are but two animals that are alleged to be subject to a separation of the bones of the pelvis during parturition, viz., the cow and the guinea pig; and even in case of the former, doubts are entertained, by many, as to its probability.

SECTION IV.—OF THE DIVISIONS AND DIMENSIONS OF THE PELVIS.

Anatomists have divided the pelvis into two, viz., the large and small, or the false and true, the linea ileo-pectinea being the dividing line; the large or false pelvis consisting of the wings of the ileum. This, being all above the brim, possesses but little if any interest in an obstetrical point of view.

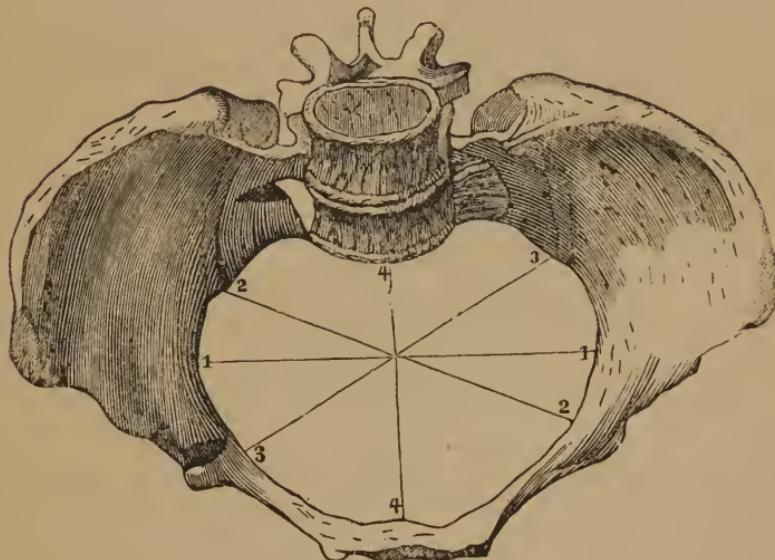
It is the small or true pelvis that demands our particular attention, and present itself for our special study. It consists of the superior strait, inlet or brim, Fig. 8, the cavity, Fig. 7, and the inferior strait or outlet, Fig. 9. Each of these straits has its axis, which with their diameters, have most important practical bearings, and with which every student must become perfectly familiar, if he ever expects to follow this branch of his profession with comfort and success.

The superior strait or inlet is formed by the linea ileo-pectinea, laterly and anteriorly, and by the promontory of the sacrum posteriorly. It is rather oval or elliptical in shape, the regularity of the figure being broken by the inward projection of the promontory of the sacrum; from which circumstance its shape has been inaptly compared to that of the heart on the

playing card. It bears a much stronger resemblance to that of the horse's hoof.

Being elliptical it must present a long and short diameter, the long diameter is the transverse or lateral, Fig. 8, 1, 1, and extends from one side to the other, at their most distant points, and meas-

FIG. 8.



DIAMETER OF THE SUPERIOR STRAIT.

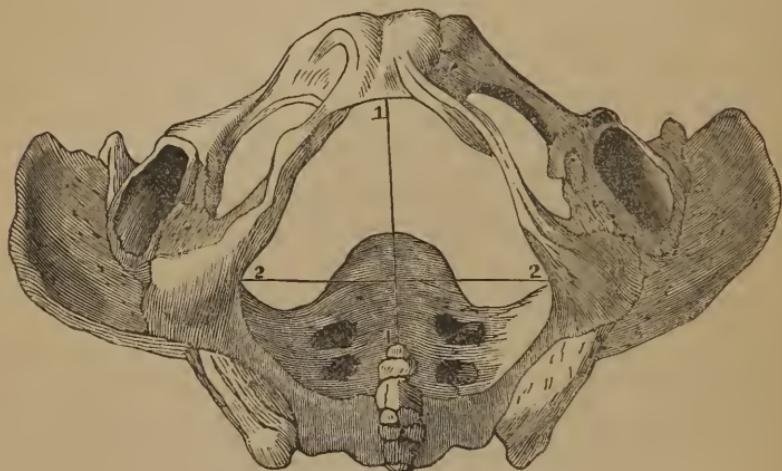
ures from five to five and a quarter inches. The oblique diameter extends from the sacro-iliac sychondrosis to about the middle of the horizontal ramus of the pubis, on the opposite side, 2, 2, and 3, 3, and is about the same length as the transverse. Some authors make a quarter of an inch difference in the length of the transverse and oblique diameters. Some give the difference to one and some to the other.

The short, or the conjugate, or antero-posterior diameter, runs from the symphysis pubes to the centre of the promontory of the sacrum, 4, 4, and is from four to four and a half inches in length.

The inferior strait is also elliptical in its general shape, but more irregular in figure than the superior, owing to the os coccygis extending far into it posteriorly, and the deep, excavated arch anteriorly. The long and short diameters of the inferior strait

run in opposite directions from those of the superior, so that the two diameters of each of the straits run at right angles with each other, *i. e.*, the long diameter of the inferior strait is the antero-posterior, and the short one the transverse.

FIG. 9.



DIAMETER OF THE INFERIOR STRAIT.

The long diameter extends from the lowest point of the symphysis pubis to the point of the coccyx, Fig. 9, 1, 1, and is about four and a half inches in length. The short or transverse extends from the middle of the internal margin of the tuberosity of the ischium, on one side, to a corresponding point on the other, 2, 2, and measures three inches and a half.

The cavity of the pelvis consists of the entire space between the two straits, and varies in depth at different points. The greater depth is from the promontory of the sacrum to the point of the coccyx and is about five inches. The next greatest depth is from the brim to the most inferior margin of the tuberosity of the ischium, and is about three and a half inches, while its most shallow part is at the symphysis pubes, which measure about one inch and a half.

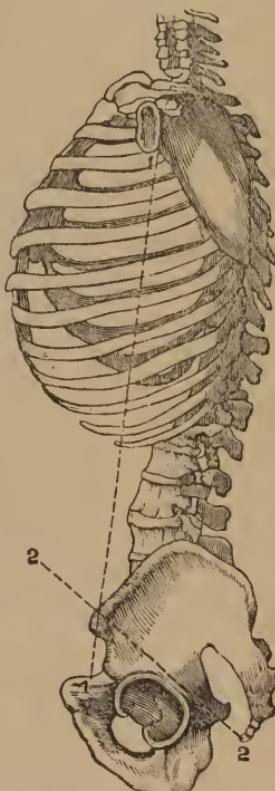
These measurements of the pelvis are not to be taken from different specimens that may accidentally fall into our hands, for there would probably be as much variation in them as there is in the size and shape of the different individual women we daily meet with. In order then to arrive as nearly as possible at accuracy, in regard to the aggregate size of the pelvis, it is neces-

sary to assume a standard of measurement, from which it is expected there will be constantly occurring variations to a greater or less extent, both above and below, but these will not affect the medium dimensions that have just been given.

SECTION V.—THE POSITION OF THE PELVIS AND ITS AXES.

Viewed in the skeleton, the pelvis will be seen to occupy neither the horizontal or vertical position, but an oblique one. By this arrangement the gravid uterus, during the last weeks of pregnancy, finds a firm resting place, and ample support upon the symphysis pubes. Were it horizontal, this point could not be made available as a support, and the uterus from its gravity would constantly be settling down into the cavity, causing the greatest amount of distress, if, indeed it did not entirely preclude locomotion or the erect posture. Were it vertical as in quadrupeds, in many of which it approaches much nearer this position than in the human subject, it would alike be unable to aid in supporting the weight of the uterus during pregnancy. In the human subject it not only contributes largely to support the gravid uterus, but the entire abdominal viscera owe their maintenance, *in situ*, mainly to this position, while in quadrupeds they are sustained wholly by the abdominal parieties. By studying the axis of the trunk, in relation to that of the superior strait, we can readily perceive the philosophy of the mechanism, and the necessity of bringing them in apposition at the time of labor. A line, 1, 1, drawn through the centre of the trunk will be seen to fall near the middle of the symphysis pubes. During the parturient efforts, the action of the uterus and abdominal muscles, which, during a part of the process are in concert, forces the head strongly upon the symphysis pubes, instead of assisting it to enter the brim. But let the axis of the trunk be brought in direction of

FIG. 10.

THE AXES OF THE TRUNK
AND SUPERIOR STRAIT.

the axis of the superior strait, and the head is removed from the pubis, and is engaged at once in the strait; and a great deal of time and suffering saved the patient.

The axis of the superior strait is indicated by a line perpendicular to its plane. If a piece of pasteboard were cut to fit the brim exactly, it would represent the plane of the superior strait, and a line drawn from the umbilicus to the point of the coccyx, would penetrate this plane perpendicular to it. This then constitutes the axis of the superior strait. Now to bring the axis of the trunk in direction with that of the superior strait, the trunk must be bent forward upon the pelvis, at an angle of about thirty-five degrees. The unphilosophical and awkward position, preferred by some practitioners, of placing the patient upon the back, during labor, deprives her entirely of the advantage that might be gained by observing the course indicated.

The superior strait looks upwards and forwards, and the inferior downwards and backwards. The axis of the latter cannot, therefore, be in the same direction as that of the former. A line drawn from the centre of the promontory of the sacrum, to a point midway between the tuberosities of the ischia, will give the axis of the inferior strait or outlet which is perpendicular to its plane. The lines indicating the axes of these two straits will be seen to cross each other in the cavity, at an obtuse angle. The body of the child in passing through the pelvis, and following the direction of these axes, performs a curve, or the segment of a circle, in accommodating itself to the shape of the channel. This curve in the pelvic canal is called Carie's curve, in honor of the anatomist who first described it.

1. *The inclined planes of the Pelvis.* The soft structures lining the interior of the pelvis. convert the cavity into four inclined planes; the head in passing down which, is forced to rotate, so as to throw the occiput either under the arch of the pubis, or into the hollow of the sacrum.

SECTION VI.—THE DIFFERENCE BETWEEN THE MALE AND FEMALE PELVES.

In examining the two skeletons, one the male and the other the female, placed side by side with each other, a marked differ-

ence between them will readily be perceived. The bones of the former will be seen to be firmer, heavier and rougher, affording a stronger attachment of the muscles, and much less delicate in their texture; in fact the whole framework is indicative of strength and endurance, rather than symmetry and beauty, which are the leading characteristics of the latter. But the greatest will be observed in the pelves—the ala of the ilea are longer and more perpendicular in the male than the female, in the latter they are shorter and spread out more latterly, giving a greater breadth of hips. In the male the antero-posterior diameter of the superior strait is longer than the transverse, while the reverse is the case in the latter. In the former the ischia are longer, and the sacrum longer and straighter than in the latter, giving the cavity greater depth and less antero-posterior and lateral capacity; in the latter the ischia are shorter, and the sacrum shorter and more curved, rendering the cavity more shallow and more capacious. And at the inferior strait the tuberosities of the ischia in the male approach each other much nearer than in the female, thus distinguishing the transverse diameter of the outlet, while in the female they rather diverge from each other, giving greater amplitude to the strait.

But upon examination, perhaps the most remarkable difference between the two will be observed at the arch of the pubes. In the male it will be seen to be long, sharp and angular, while in the female it presents a bold, round, arch-shaped figure, with the rami of the ischia and the pubes much shorter, with their inner edges flaring a little outwards, giving the arch a more graceful and finished appearance.

There is a number of other points of difference that might be mentioned, but the foregoing more prominent ones are deemed sufficient, to enable the student to distinguish the one from the other.

SECTION VII.—THE DEFORMED AND DISTORTED PELVIS.

Unfortunately for child-bearing women, the pelvis is not always of the favorable dimensions, that are assumed as a standard. It may be too large or too small, or the otherwise normal diameters may be shortened by the presence of nodes or protuberances from imperfectly adjusted fractures of the pelvic bones, or from a pre-

ternaturally inward inclination, and undue length of the spinous processes of the ischium, or from an ankylosis of the coccyx, &c. While either of the foregoing deformities may cause a great deal of delay, and tend to complicate the labor, they cannot but be considered of minor consequence, when compared with the graver varieties that are occasionally met with in practice.

The evils arising from excessive size are numerous and grave. This condition favors the various displacements of the uterus in the ungravid state, as prolapsus, retroversion, anteversion, and right and left obliquity. The liability to these distressing accidents is in exact ratio to the amount of divergence from the usual standard of dimensions. The natural supports of the uterus being diminished in proportion to the excessive capacity of the cavity, it is with corresponding facility thrown from its normal position, and either one, or a complication of the above-mentioned displacements, is liable to occur, accompanied with its train of distressing and painful symptoms. The patient is none the less liable to a series of disasters even more painful and dangerous, resulting from mal-positions of the gravid uterus. The increased weight of the organ, in early pregnancy, favors its tilting backwards into the hollow of the sacrum, or sinking down behind the symphysis pubes; in either case it lies horizontally across the pelvis and when it should rise out of the cavity, from its increased size, as it readily does when its proper position is maintained, it is unable to do it, and is retained in the pelvis, until by its magnitude and weight all the consequences of excessive pressure upon the pelvic viscera, and the large nerves and blood vessels involved, are induced, imperiling the future health if not the life of the patient.

Should she escape this calamity, she is only awaiting others more grievous, if possible, a short time hence. If the uterus should rise above the brim as pregnancy advances, the great amplitude of the inlet, depriving it of the usual support afforded by the pubes, its tendency will be to settle down into the pelvis by its own gravity, and cases are not unrecorded where it has escaped through the external organs, inverting the vagina and dragging its appendages with it, hanging, a great tumor, between the

thighs. Fortunately, however, abortion, preferable with all its dangers and liabilities, often comes to her relief, before matters have proceeded to such dire extremities.

During labor, in case of tardiness of the os utera to dilate; by the voluntary efforts of the woman to assist herself, as bearing down, &c., the uterus may be forced down into the cavity, to the vulva, or even beyond the external organs, or should the os uteri dilate early, by the rapid descent of the fœtus, before the perinæum may have time to expand, extensive lacerations may result, requiring the aid of the surgeon, and much time to repair the injury, which cannot be borne without great suffering. And subsequent to delivery the parts return to their normal position and condition with much greater difficulty than under ordinary circumstances.

Too small a Pelvis.—The pelvis may be considerably below the assumed standard, in its dimensions, if the due proportions be maintained, and still admit of the passage of an ordinary sized fœtus. The lowest measurements that will admit of this, are four inches in the transverse, and three inches in the conjugate diameter of the superior strait; below this it is impossible for a living child to be born. Where this is the case, the destruction of the child must be resorted to, to save the life of the woman.

The difficulties arising from the lesser deformities mentioned above, may generally be overcome by the exercise of a due amount of skill and patience, without resorting to the ulterior means suggested in the last paragraph.

1. DISTORTIONS FROM DISEASE.

As most of the aberrations from the normal standard, just referred to, are congenital—to be regarded as malformations rather than special deformities; to be arrested in course of their development, or prevented by a judicious and timely application of proper hygienic and remedial means—their presence is unavoidable, not being within the reach of controlling art or restoring science, while those resulting from disease, and if possible more terrific, should be humiliating to professional pride, because the morbid conditions inducing them are amenable to treatment, when opportunities are afforded for the timely application of our art.

The diseases producing the class of deformities now under consideration, are those that affect the bones, by destroying the due proportion of animal and earthy or calcareous matter of which they are composed. When this proportion is interfered with, there is a corresponding diminution in either of these constituents. Where there is a diminution of earthy matter, the affected bone becomes soft and pliable: for instance, take a rib, let it macerate in dilute sulphuric acid sufficiently long, all the earthy matter will become removed, and the bone, though maintaining its shape, will be soft and elastic; it may be tied in a knot, and again be made to resume its original shape. While one of the thick bones, as the *os calcis*, or *astragalus*, submitted to the action of fire until all the animal matter is removed, the bone will retain its shape, but will be found much lighter, and exceedingly friable, so much so, that it can be crushed, and reduced to powder by the grasp of the hand. A due proportion of these two constituents is necessary to the proper hardness, firmness and endurance of the bone, and any disease that diminishes the quantity of the earthy matter, softens it, and renders it liable to distortion, while that which diminishes the animal matter, renders it brittle and liable to fracture.

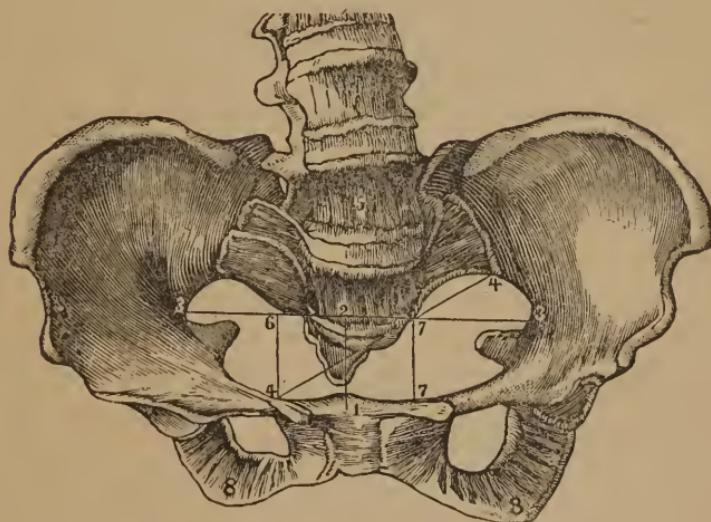
The two diseases that are said most frequently to result in a softening of the bones are *rachitis*, from *ραχις*, *rakis*, the spine of the back, *rickets*, and *malacostion* from *μαλακαχος*, *malakakos*, soft, and *οστεον* *oscon* bone; called also *mollities ossium* from *mollis*, soft and *os* bone. There have been described two varieties of deformities resulting from these diseases, the elliptical and angular. These may exist in every degree of contraction from a slight deviation from the normal standard, to the utmost diminution of the straits.

The former named disease is one of childhood, which seriously affects the entire organism, including the osseous system, which, where life is preserved, frequently remains distorted in many of its parts during life. The latter is one of adult age, and, unfortunately, usually fatal in its termination. While the softening of the bones from rickets is slow in its progress, that, arising from *mollities ossium* is rapid and general, all the bones, except the teeth, frequently being involved in its devastating course. The rapid career and fatal termination of the disease would preclude

the probability of its often, if ever producing such deformity of the pelvis as is under consideration, notwithstanding several very distinguished writers assign it a leading position among its causes, and the most common one of the angular variety, while the rickets is regarded as the invariable cause of the elliptical variety.

The deformity may be either partial or general. In partial deformity either the inlet, cavity or outlet may be distorted, while the remaining portions retain their normal dimensions. General deformity consists of a distortion of all the parts.

FIG. 11.



ELLIPTICAL DEFORMITY OF THE PELVIS.

2. *The Elliptical variety* is where the pubes, 1, and sacrum, 2, unduly proximate each other, thus diminishing the conjugate diameter. This may be to a great or small extent, while the transverse, 3, 3, and oblique, 4, 4, diameters may be proportionately lengthened. This increased length in the two last named diameters, cannot be made available to compensate for the shortened conjugate.

There must be at least three inches clear, in the antero-posterior direction, to admit of the passage of the foetal head, unmutilated. Where the shortened diameter is under this we have a choice of two expedients, viz., craniotomy and the Cæsarian section.

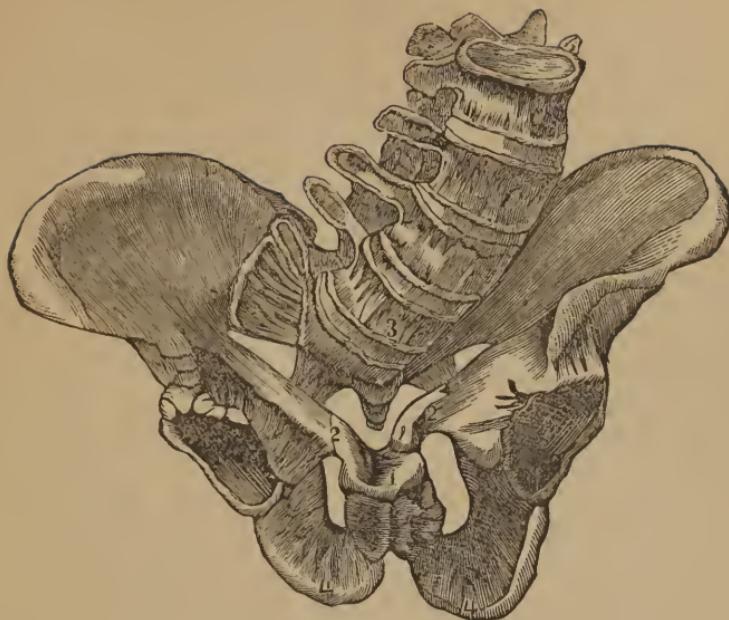
This deformity, when in a minor degree, affecting the superior strait only, usually consists of a preternaturally anterior projection of the sacro-vertebral angle, and undoubtedly is the cause of the lingering and difficult labors, which some women always experience.

But when it is excessive, there is a depression of the pubes, as well as an undue projection of the sacro-vertebral angle, involving both straits and the cavity. The elliptical deformity is induced by the patient lying on the back, while the bones are in a malleable condition, the resistance the body meets with by the bed, presses the posterior part of the pelvis forward, while the weight of the pubes, together with that of the clothing and bed-clothes presses the pubes backwards, thus the sacro-pubic space is diminished, and the lateral increased. An example of this action is afforded by a malleable ring, which, when placed edge-wise between two opposing forces, will yield, the two points pressed upon are made to proximate, while the opposite points left free, will recede from each other, thus decreasing one diameter, and increasing the other.

Fig. 11.—The “antero-posterior diameter, 1, 2, is one and a half inches; on the right side of the sacral promontory, 4, 6, in the antero-posterior diameter, there are two inches; the lateral diameter of the brim, 3, 3, following the curve in a central line equidistant from the sacrum and pubes, measures six inches and a quarter; at the outlet, the extreme width between the ischia 8, 8, is five inches and a half; from the point of the coccyx to the under margin of the symphysis pubes, four and a half. Through a pelvis of this form and size, the foetus might be extracted by instruments adapted to craniotomy.”—*Ramsbotham*.

3. *The Angular Deformity* is where the pelvis is pressed together laterly, and where the inlet only is implicated, the pubic bones project anteriorly at a sharp angle, increasing the conjugate diameter and diminishing the lateral but this increased antero-posterior space avails nothing in compensating for the diminished lateral, as four inches clear space transversely is required to allow of the passage of the head of a full grown foetus, and where the measurement is below this, one or the other of the above-mentioned terrible resources must be employed to effect de-

FIG. 12.



ANGULAR DEFORMITY OF THE PELVIS.

livery. The difficulties presented in this variety of distortion, when existing to a small extent, may be overcome by the proper exercise of skill and patience, without resorting to extreme measures, though much time will be required, and much suffering must be expected to be endured.

Where the deformity is general, there is a distortion of all the parts, the pubis, 1, projects far forward with a very narrow space between the horizontal rami, 2, 2. The sacro-spinal angle, 3, protrudes anteriorly over almost the entire inlet, the proportions of which are destroyed, the figure rendered extremely irregular, and contracted in all its directions. The ischiatic tuberosities, 4, 4, approach each other so closely as to greatly shorten the transverse diameter of the outlet; rendering it useless as a passage for the child's head. The *cavity* being situated between these two straits, cannot be expected to escape the general wreck of proportions and dimensions, it participates in the universal distortion and is also rendered useless.

The angular deformity is as liable to result from rickets as the elliptical, while, as has been observed, the latter is induced by lying on the back. When the bones are soft and pliable, the former is the consequence of reclining on the side, under the same circumstances.

Here its own weight and that of the clothes, &c., press laterly upon the pelvis, and the result is, as has just been described, general distortion. When the irregularity is extreme, including both of the foregoing varieties, and heightened by the addition of even a new series of deformities, the immediate cause may be the action of the many muscles attached to the pelvis, together with the pressure, under the various positions the body may assume, during the standing or sitting posture.

Ramsbotham, to render the subject more easily understood, divides pelvis into four gradations, and classifies them according to their form at the brim, since that is the part most usually, as well as most severely, affected.

The first embraces the standard pelvis—five inches and a quarter in the lateral diameter, by four in the conjugate—and all above that measurement, through which a mature foetus will escape with facility.

The second class includes those lower than the standard, but sufficiently large to permit the child's head passing alive, either naturally or by instrumental aid, and compatible with the safety of the child, and the integrity of the maternal structures. A live birth may be accomplished through a pelvis of a clear available space of four inches in the lateral diameter, and three in the conjugate. The third class comprehends every pelvis of such a size as would admit of a well-educated practitioner extracting a foetus through it, after the bulk of the head has been diminished, by cutting instruments, to the smallest possible compass, which is one inch and three-eighths in the conjugate by three and a half in the transverse diameters, or one inch and a half in the conjugate by three in the transverse. With lower dimensions than these it would be useless to attempt delivery *per vias naturales*.

In the last class or gradation are to be included all pelvis below the minimum space just mentioned, through which it is impossible for the most skilful and experienced operator to extract a foetus, even after the brain has been evacuated, and the body diminished to the utmost extent that art can accomplish. In case of such extreme deformity, no means remains of rescuing the woman from death, through exhaustion, but to open the abdomen, cut into the uterine cavity, and extract the foetus by the artificial aperture; an operation horrible to contemplate, and which in the British

islands, has, with three exceptions, proved universally fatal to the mother, but which has been far more successful in this country.

Fig. 12 is a cut of the pelvis of Isabel Redman, on whom Dr. Hull performed the Cæsarean operation, September 22, 1794. A single glance will show its extreme deformity; to demonstrate which, it is only necessary to mention that a ball of one inch in diameter will not pass through the brim at any part. It is the smallest brim of a pelvis on record.

Fig. 11 and Fig. 12, when compared with Fig. 7, will exhibit the marked difference between normal and vicious pelves. Though Fig. 11 does not represent the extreme degree of elliptical deformity that the pelvis may attain, it is nevertheless a good specimen of the class. Fig. 12 shows the greatest extent of the angular deformity that is recorded, and therefore represents the greatest extreme of that class.

The diseases resulting in a softening of the bone, (especially rickets) are those developed under bad hygienic influences—such as bad nourishment, bad ventilation, damp and gloomy apartments—with an insufficient amount of exercise in the open air, &c. Children reared under such circumstances, are those that must frequently suffer from this distressing and ruinous disorder. It is more frequently found, therefore, among the poorest and most destitute classes. As extreme poverty and destitution do not exist to as great an extent in this country as they do in many of the more populous districts of Europe, the disease is not so common here as in the latter country; and there are fewer cases of deformed pelves among our native women than are met with among the female emigrants from the old world.

Curvature of the spine frequently results from the same cause, the vertebra of the spine becoming soft, the weight of the head and upper extremities, and remaining upper part of the trunk, bearing upon the diseased portion, produces a curvature either internally or externally. In the former case there is an undue fulness of the breast, and the person is called pigeon-breasted—in the latter there is a hump upon the back, and she is called humpbacked. When the curvature occurs at the sacro-spinal angle it is always internal, and constitutes one variety of elliptical deformity. A curved spine may give rise to a well-grounded suspicion of a deformed pelvis.

SECTION VIII.—OF PELVIMETRY AND PELVIMETERS.

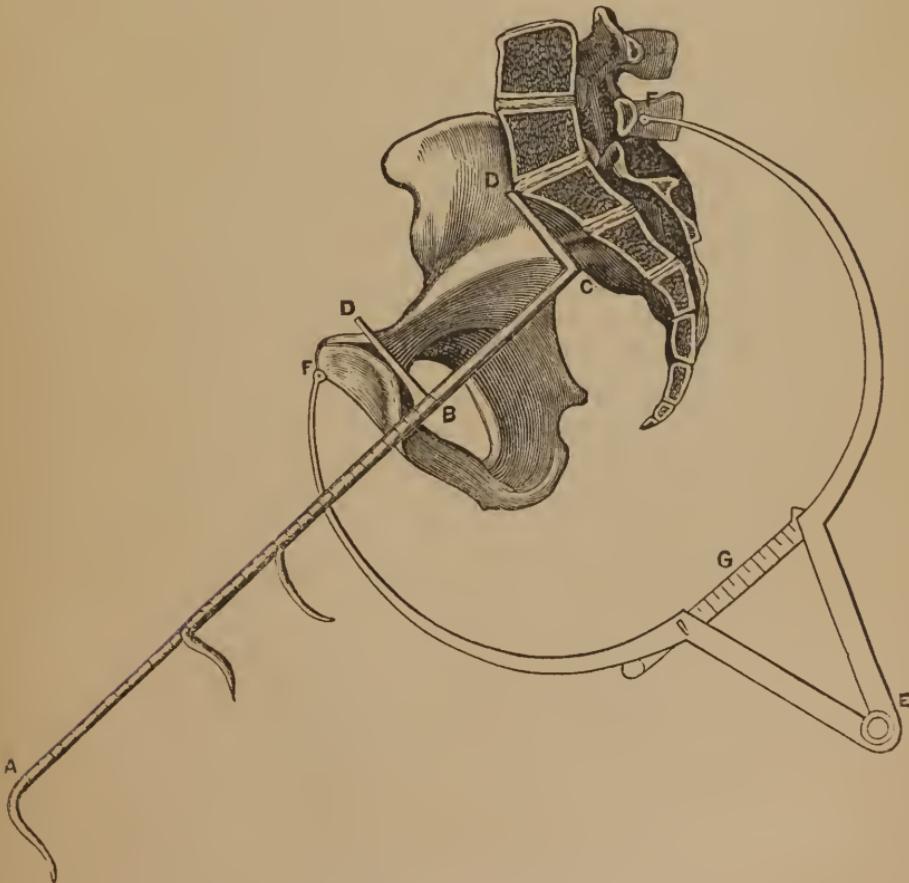
In view of the great distortions to which the pelvis is liable, it is desirable that the obstetrician should possess some means of ascertaining the exact dimensions of the straits, and the capacity of the cavity, where evidences of deformity are apparent. Not only at the time of labor is it highly important that this knowledge should be obtained, in order to enable him to shape his course to the best advantage of his patient, but prior information may prompt him to adopt measures whereby the dangers of her situation may be averted, and much agony and distressing anxiety be avoided.

In order to acquire this desirable information the aid of many mechanical inventions has been invoked, among the most ancient of which is an instrument known as Coutauly's pelvimeter; to which has been added an improvement by Madame Boivin, which she called an intro-pelvimeter; the *compas d'epaisseurs*, or calipers of Baudelocque; Stein's pelvimeter, and the pelvimeter of Wellenbergh, to which is added the more recent invention of M. Van Huevel, a professor at Brussels; each of these has its admirers and defenders; while others, as Dunglison, of Philadelphia, and Ramsbotham, of London, aver that the best pelvimeter ever used is the human hand. Dunglison says of Coutauly's pelvimeter, "it is a barbarous contrivance, and its introduction ought never to be attempted on the living subject." Ramsbotham and Cazeaux speak unfavorably of its use. This instrument and that of Baudelocque, bear a strong resemblance to two mechanical implements employed by different tradesmen. The first is almost a fac simile of the measuring stick used by shoemakers in measuring the length of feet; and the calipers or pelvimeter of Baudelocque, bear as great a likeness to the calipers used by turners for measuring their work. The instrument of Coutauly is designed to be applied internally, while that of Baudelocque is used externally. The former consists of "two iron rules, which slide on each other, and each having a short plate fixed at right angles on one of its extremities. When it is introduced into the vagina, the two rules are slipped along each other, so as to get one of the plates against the sacro-vertebral angle, and the other just behind the posterior face of the symphysis pubes. One of these rules is marked by a scale, which indicates the degree of separation of the

two plates, and, consequently, the length of the sacro-pudic diameter." Its use is so objectionable that it has been banished almost entirely out of practice.

The improvement of Madame Boivin consists in having its two constituent branches simply articulated, so as to allow them to be separated, and introduced singly, one part into the rectum and the other into the vagina, in this way the sacro-vertebral angle and the internal face of the symphysis pubes are gained and the distance between them marked. This is a less objectionable contrivance than the original so far as pain, induced by its employment, is concerned, but it has never found any special favor, and consequently never came into general use.

FIG. 13.



PELVIMETRY AND PELVIMETERS.

Baudelocque's calipers or pelvimeter differs widely in fashion from the one described above. It consists of legs, a joint, two buttons, one at the free extremity of each leg, and a graduated bar. The legs, which are united at the joint, are straight to the point, where the graduated bar is introduced; from this they curve in opposite directions, and when closed the buttons come together. In use, one of the buttons is placed on the spinous process of the first division of the sacrum, and the other to the upper part of the symphysis pubes. The graduated bar indicating their distance apart.

From this measurement is deducted two and a half inches for the soft parts and the thickness of the sacrum, and half an inch for the intervening space between the mons veneris and the inner surface of the symphysis pubes, the remainder will give the clear sacro-pubic space. This, at first view, would appear to be a very correct and satisfactory means of ascertaining the antero-posterior diameter, but the uncertainty in regard to the thickness of the parts to be deducted from the first measurement, renders the instrument almost useless. These bones are so variable in their thickness, both in a normal condition and when modified by the action of disease, that anything like precision cannot be arrived at by this means.

In the annexed cut is a view of both instruments and the manner of their application. A, B, C, D, D, represents Coutouly's pelvimeter, and E, F, F, G, represents the calipers of Baudelocque. Any further description of them is deemed unnecessary, as they have already received more attention than their merits warrant. Some of the other inventions that have been brought forward, as means for ascertaining the exact measurement of the antero-posterior diameter of the superior strait, are perhaps entitled to a little more confidence than the above, but as all of them are inferior to that invaluable and strangely mysterious instrument, possessed by every obstetrician, the living, moving human hand, they are hereby dismissed, and the attention of the student called to the use of the hand in diagnosing the true condition of the pelvis.

While most of the authors consulted on the subject agree that the hand is incomparably the best means that can be employed in making a correct survey of the pelvis, and of gaining the most satisfactory information in regard to its vices and virtues, there is as much variance in reference to the manner of employing it, almost as there is in respect to the preference of the various artifi-

cial appliances that have from time to time been introduced. One class, as represented by Cazeaux, recommends the index finger alone; another, by M. Guillemot, the whole hand; a third, by Ramsbotham, prefers the two first fingers of the left hand; and a fourth, by M. Velpeau, who advises either of the two latter expedients, as the case under examination may require.

The manœuver practiced by Ramsbotham is decidedly the most practical and the most easy of accomplishment. Fig. 14 representing a vertical section of the pelvis, shows its operation. It is by no means necessary that the left hand should always be used. The obstetrician should be at liberty to select the one that may be the most convenient at the time. In case of either, the patient should be placed upon the side, with the thighs flexed upon the abdomen, and the legs upon the thighs; in this position the vulva is most easily approached from behind. The side upon which she should be placed must be determined by the choice of hands to be employed; if the left hand be designed to be used, she must be placed on the left side; if it be the right, then the right side must be selected. The hand then having been selected, and the patient placed on the bed accordingly, at a convenient distance from the edge, the obstetrician takes his seat at her back with the hand designed to be employed next to her. The hand should then be lubricated with a little lard, or olive oil, and then passed up, un-

FIG. 14.



MANUAL MEASUREMENT.

der cover, (the least exposure of the patient's person being unnecessary,) and brought in contact with the vulva, the two first fingers are introduced, the index is placed behind the symphysis pubes, about midway of its length, and the second one is extended to the promontory of the sacrum, 2. The distance between the points of the fingers gives the sacro-pubic diameter. In an ordinarily-sized hand, the space between the ends of these two fingers, placed in that position, is within a line or two, four inches. If after the index has been placed in position and the second finger be extended to the full degree of his ability to do it, and the sacral promontory be reached, the operator will know the distance between the two points is four inches; if the promontory cannot be thus reached, he will know it is more than four inches; if it can be reached with a very slight extension, he will know that the sacro-pubic space is correspondingly short. He must use his judgment in approximating the exact length. Velpeau directs that when the two fingers are used, and their ends are placed upon the two points indicated, two fingers of the other hand must be placed between their bases, so as to prevent their moving in being withdrawn, and then a measure be applied to them. This might answer the purpose of precision were the fingers stiff from their bases to their outer extremities; but as there are two joints each, left unguarded, and just as liable to be moved as those protected, it is evident that such measurement would amount to but little more than a smart guess.

Ramsbotham in urging his favorite plan, says, "the laxity of the vagina, and other soft structures, which almost invariably attends the process of labor, will permit the fingers to be withdrawn extended; and if the examiner uses sufficient care, they may be kept perfectly steady until the space which they embrace be ascertained." Here measurement is to be attempted, even without the precaution of Velpeau, which certainly cannot be more accurate. Such measurements are no more reliable than those effected by means of artificial instruments. If the obstetrician have not judgment to enable him to arrive at a satisfactory diagnosis, without resorting to the measurement of his fingers, he had better change his vocation, for one requiring less mechanical skill.

So the object in view be obtained, it matters but little whether

one finger or the whole hand be employed. The end is of far more consequence than the means. It will require a due exercise of judgment to arrive at a correct diagnosis, let what means be employed that may, and it amounts to little else than a useless waste of time to be discussing them and the various notions entertained concerning them.

1. *External pelvimetry* furnishes important data for making out a correct diagnosis in regard to the internal conformation of the pelvis, which should not be disregarded by the student. The following table of measurements furnished by Cazeaux, is given "as the average of a well-formed basin." In conducting "the practice of pelvic mensuration" the use of Baudelocque's calipers or pelvimeter and an ordinary carpenter's rule are needed; in the absence of the former instrument, a turner's calipers will answer as a convenient substitute.

2. MEASUREMENT OF THE PELVIS EXTERNALLY.

1. From anterior-inferior spinous process of one ileum	INCHES.
to the same point on the opposite side.....	8½
2. From the anterior-superior spinous process of one side to the same point on the other.....	9½
3. From the middle of the iliac crest of one side to the same point opposite.....	10½
4. From the middle of the iliac crest to the tuber ischia	7½
The superior strait divides this distance into two equal parts, whence the lateral portions of the greater and lesser pelvis are each	3¾
5. From the antero-superior part of the symphysis pubis, to the apex of the first spinous process of the sacrum	7½
From which 2½ inches are to be deducted for the thickness of the base of the sacrum and $\frac{1}{2}$ an inch for that of the symphysis; therefore leaving for the sacro-pubic interval	4½
6. From the tuber ischii of one side to the posterior superior spinous process of the opposite ileum the mean extent, in an ordinary pelvis, is.....	7

	INCHES.
7. From the anterior-superior spine on one side to the posterior-superior spine of the other the mean is...	$8\frac{1}{4}$
8. From the spinous process of the last lumbar vertebra, to the anterior-superior iliac spine of either side, the mean is.....	7
9. From the trochanter major of one side to the posterior-superior spinous process of the opposite one	9
10. From the middle of the lower border of the symphysis pubis to the posterior-superior spinous process of either side.....	$6\frac{3}{4}$

Any material deviation from these measurements indicates a corresponding deviation from the standard dimensions of the interior of the pelvis, and suggests the necessity of an internal examination.

Contraction of the transverse and oblique diameter of the superior strait, distortions of the cavity, and shortening of either diameter of the inferior strait, must be determined by the experienced hand, and the extent of deformity estimated by an enlightened judgment, as no positive rule of measurement can be given, that will admit of universal application, in these cases, any more than can be, in regard to that of the antero-posterior diameter of the inlet.

SECTION IX.—OF THE FŒTAL HEAD AT TERM.

Having studied the normal and abnormal configurations of the pelvis, its straits, their axes and diameter, and traced the channel through which the fœtus passes in its transition from intra to extra uterine existence, the student is now prepared to examine the foetal head, and study its form, structure, dimensions and adaptability to its means of exit. It being the largest and least compressible part, its passage through the pelvis is accomplished with more difficulty than the remaining parts of the fœtus, and much more time is consequently required in effecting it. This renders it an object of especial interest to the obstetrician, and a familiarity with all its properties indispensable to success in the practice of his art.

The general shape of the head at term, is oval; the cranium, that, with which we are most concerned here, is composed of eight bones.

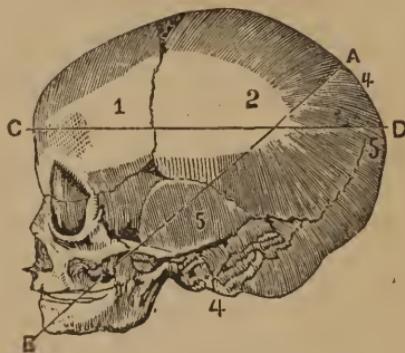
With the different bones of the face, obstetrically, we have nothing to do; it is those constituting the bulk that claim our particular attention. The bones entering into the composition of the cranium are single and in pairs. The single ones are the *os frontis*, *os occipitis*, *os sphenoides* and *os ethmoides*. Those in pairs are the *ossa parietalia* and *ossa tempora*.

The os frontis, frontal bone, called formerly, *os coronale*, and *os inverecundum*. The frontal bone, 1, constitutes the forehead, and forms the whole anterior, and a portion of the superior, lateral and inferior parietes of the cranium. It is convex on the external surface and concave on the internal. In foetal life and early infancy it is divided into two bones, by the continuation of the suture dividing the parietal bones, Fig. 16, 1, 1. Usually this suture becomes obliterated in adult life, and the two halves become consolidated into one bone, leaving only a faintly marked ridge indicative of its former existence; occasionally, however, it continues during life, dividing the bone into two halves. It forms the roof of the orbit of the eyes.

The ossa parietalia, parietal bones, from *paries*, a wall, because they defend the brain like a wall. They were formerly called *ossa sincipitis*, *ossa verticalia*, *vel Bregmatis*, &c., Fig. 15, 2, and Fig. 16, 2, 2. These bones form the superior and lateral parts of the middle of the skull or cranium. They are in shape quadrilateral, convex externally and concave internally.

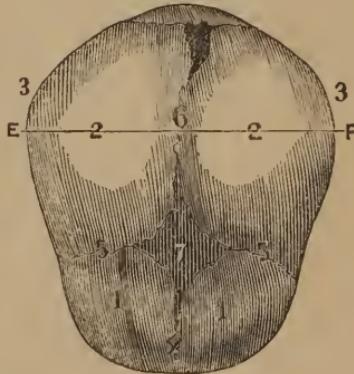
The external surface of the parietal bones is raised about their

FIG. 15.



FETAL HEAD.

FIG. 16.



middle, into what is called the parietal protuberances, Fig. 16, 3, 3. The parietal bones unite with each other on the top of the head, and with the frontal, the sphenoid, the temporal and the occipital bones.

The *os occipitis*, occipital bone, from *ωιον*, *inion*, occiput. The back part of the head, called formerly *os memoriae*, *os nervosum*, *os Basilare*, &c., Fig. 15, 4, 4. This bone in shape is quadrilateral, and has been compared to a trapezium. It is convex externally and concave internally, and forms the largest share of the posterior, and a portion of the inferior parietes of the cranium. It consists of four pieces. It is remarkable for the foramen magnum, a large hole in its lower section, which transmits the spinal marrow, its membranes and blood vessels. About half way between the foramen magnum and the upper margin of the bone is a well-marked prominence called the occipital protuberance; this is the most posterior point of the cranium, and forms a terminus of one of the diameters of the head. The occipital bone unites above with the parietal, laterly with the temporal, and in front with the sphenoid.

The *ossa tempora*, temporal bones, from *tempus*, the temple, Fig. 15, 5. These bones form portions of the inferior lateral parietes, and of the base of the cranium. They are divided into three portions, the circular anterior portion is called the squamous, from *squama*, a scale; behind it is the mastoid, from *μαστος*, *mastos*, a breast, and *ειθος*, *eithos*, resemblance, from its resemblance to the nipple of a breast. The part takes its name from a nipple-like process for which it is noted, called the mastoid process, but which in the foetal head is but rudimentally developed. Between the squamous and mastoid portions is the petrous, from *πετρα*, *petra*, a rock, so called on account of its extreme hardness. In this portion are located the organs of the sense of hearing.

The squamous portion is thinner than the other bones of the cranium; its exterior surface is smooth and slightly convex; it articulates with the lower jaw. The mastoid portion is thick and cellular, and is remarkable for the mastoid process. The petrous portion is a triangular pyramid, arising by a broad base from the inner side of the mastoid and squamous portions. It is placed obliquely forward between the sphenoid and occipital bones. This

portion receives the auditory nerve and the eustachian tube. The temporal bones unite with the occipital, the parietal, the sphenoid and the malar.

The sphenoid and ethmoid bones being placed in the base of the cranium, have but little to do in forming its bulk ; they therefore possess but trifling interest obstetrically, and are dismissed for the present without further comment.

THE SUTURES AND FONTANELS.

At the time of birth, the contiguous margins of the flat bones simply approach each other, but are not interlocked as in adult life. The edges are held together by the dura mater internally and pericranium externally ; the fissures between them are called sutures, and are very obvious, and so large as to allow of considerable motion, and even the mounting of one bone upon the other by slight pressure. Dr. Horner remarks : " It is always to be observed that the base of the cranium is an exception to the latter rule, both from the breadth of its articulating surfaces, and from its comparatively advanced ossification. In parturition, therefore, the vault of the cranium, by its mobility is adjusted to the contour of the pelvis, but the base does not yield in either of its diameters to the expulsive powers of the uterus. The latter provision, however inconvenient in parturition, is of the greatest consequence immediately afterwards ; for, without this immobility in the base of the cranium, whenever the weight of the head was thrown upon it, the pressure of the vertebral column would drive it upwards, to the injury of brain and the nerves proceeding from it. This resistance, it may be added, is still further assisted by the arched figure of the base of the cranium. On this subject it is not a little remarkable that even the heads of hydrocephalic foetuses have the bones at the base fully ossified, and in contact, so as to support the weight of the head in the vertical position." Our author might have gone further in showing the advantages of this arrangement at the base of the cranium, in affording resistance to the encroachments of the spine upon the brain during pressure ; for far greater pressure is sustained at that point during labor than is ever produced by the weight of the child's head afterwards. The action of the uterus upon the body of the foetus,

in forcing the head through the pelvis, would be far more likely to "drive" the spine into the brain, than would the weight of the child's head after birth, were it not thoroughly protected, by advanced ossification, and smallness of the sutures. The "inconvenience" during parturition, alluded to by our author, from the immobility of the bones at the base of the cranium, is not so apparent, when it is considered that the breadth of the skull between the parietal protuberances is as much greater than that of the base as is the space gained by the compression of the former and this firmness at the base, instead of being an inconvenience, is a positive advantage, inasmuch as it sustains the head, during the pressure necessary for the contraction of its bulk.

The suture, from *suo*, to join together, dividing the frontal bone into two halves, being a continuation of the sagittal, Fig. 16, 4, is called the frontal suture. That separating the frontal from the parietal bones, 5, 5, is called the coronal suture, from *corona*, a crown or garland, so named because the ancients wore their garlands in that direction. The one dividing the parietal bones is called the sagittal, 6, from *sagitta*, an arrow, because it is shaped like an arrow. That separating the parietal bones from the occipital, is called the lambdoidal, from being shaped like the Greek letter λ , L, Fig. 15, 5. That separating the temporal bone from the frontal, parietal and occipital bones is called the squamous suture.

The Fontanelles. Derivative of *fons*, a fountain, supposed by the ancients to emit moisture. They are six in number, and are the result of the imperfect ossification of the angles of the bones. The two most important, in an obstetrical point of view, are on the middle line of the head above, Fig. 16, 7, 8, and two on either side, one of which is placed at the angle of the temporal bone, where it subsequently joins with the parietal and occipital bones; the other is in the temporal fossa, between the parietal and sphenoid bones. These are but little referred to by accoucheurs in delivery, as they are irregular and indistinct.

The two fontanelles requiring the particular attention of the obstetrician, are those on the top of the head, and constitute the openings of the head. They are situated one at each extremity of

the sagittal suture, and from their position are called the anterior and posterior fontanelles, Fig. 16, 7, 8.

The anterior fontanel, 7, is quadrangular or diamond-shaped, and the anterior edge is generally longer than the other; it is sometimes remarkably so. The peculiar shape of the anterior fontanel is derived from the absence of ossification at the angles of the parietal and the two parts of the frontal bones, by which it is formed.

The posterior fontanel, 8, is much smaller than the latter, and is situated at the posterior extremity of the sagittal suture; it is triangular in shape, the rounding off of the posterior-superior corners of the parietal bones, forms two sides of the triangle, and the upper margin of the occipital bone the third side.

A perfect knowledge of the situation and shape of the fontanelles is indispensable to comfort and success in practice. The truth of the axiom that "knowledge is power," is nowhere more signally verified than in the practice of obstetrics; for here knowledge gives power to decide, to act and to accomplish infinitely more than could be done without it. The fontanelles indicate the presenting part, as the head enters the pelvis. If the small triangular space be readily felt, it indicates that the apex is the presenting part, which is the most favorable presentation; and if it be found at the left side of the pelvis, it will be known that it is presenting in the most favorable position; and all things being equal, a favorable, comfortable, if not a speedy termination of the labor may be anticipated.

On the contrary, if the large quadrangular space be detected, the indication is that the forehead is the presenting part, and it requires more space to pass than the apex, conditions are less favorable than in the other case, and more time will be required and more uterine force needed to consummate the work; hence the prognosis is a more protracted and painful labor.

A knowledge of the direction of the sutures is scarcely less valuable than that of the fontanelles, as a means of diagnosis. For instance, if the sagittal suture, Fig. 16, 6, be found to extend laterally across the superior strait, when neither fontanel can be felt, it is evident that the head is entering with its long diameter in the same direction with the long diameter of the strait. As the fontanelles

are at the two extremities of this suture, one must be at the left side of the pelvis and the other at the right; in either case the presentation is a favorable one; but if it be found that the suture is traversing the antero-posterior diameter, it indicates the long diameter of the head is entering the pelvis in the direction of its short diameter, which is a very unhappy presentation, requiring manual interference to adjust it.

When we come to consider all the fontanelles and sutures together, and the loose manner in which the form and bulk of the head is constituted, in consequence of them, we are not discomfited nor alarmed when there is reason to believe that the child's head is considerably disproportioned to the size of the pelvis, for we know that these afford ability for a degree of contraction, under sufficient pressure, even to the overlapping of the bones, adequate to overcome no inconsiderable amount of difficulty, without the interference of art, though much time and suffering may be required to accomplish it.

Men and women, vastly differing in size, are often seized with a strange fascination for each other, and the diminutive, dwarfish girl fancies a huge, overgrown man; and he allows his judgment to be silenced and his fancy to revel in the charms of his prospective pigmy wife, marriage ensues, and pregnancy is the result, of course. Should the product of this unwise alliance inherit the physical proportions and organization of the father, the disproportion between it and the maternal pelvis is apparent. Even under these untoward circumstances the construction of the foetal head enables it to accommodate itself to the small diameters of the pelvis, and the child has a very fair chance of being born alive, by the natural process. Upon this point Dr. Ramsbotham observes: "This power of diminution is greatest in the lateral diameter; and a full grown foetal head may be lessened from side to side, without endangering the child's life, one-seventh of its own extent, or from three and a half inches to three inches. This overlapping of the bones is of common, nay, almost universal occurrence; and the compressibility of the head should teach us to hesitate and consider well the bearing of the case, before we take in hand an obstetrical instrument, especially such a one as cannot be used without the sacrifice of the child's life; for it is constantly observed

in practice that a fortunate and natural termination has occurred in cases where a few hours before it was believed impossible that the child could be born without instrumental interference."

The Dimensions of the Foetal Head. These are determined by imaginary lines extending from opposite points of the head, called diameters. As was the case in establishing a uniform scale of measurements for the pelvis a standard had to be assumed, so also the same course has to be pursued in regard to the foetal head; where there is such a diversity of sizes, it would be impossible to establish a standard of measurements without assuming one. Some authors give a multiplicity of diameters, which tend to perplex and confound the student, rather than enlighten him in reference to their practical utility. From amongst the great number given by some writers on obstetrics, only three, as possessing sufficient practical importance to claim attention, have been selected, and these are they that correspond with the diameters of the pelvis, with which, during labor, they hold a most intimate relation. Should it become necessary, hereafter, when we come to consider the mechanism of labor, in all the various presentations, to introduce one or two others, it can be done perhaps with advantage, without detriment to the simplicity of our present plan. As it is only during this process that the diameters of the head have any interest or value obstetrically, it is deemed useless to load the student with a catalogue that is mainly if not wholly irrelevant to the object in view.

The long diameter of the foetal head is the occipito-mental, extending from the posterior edge of the posterior fontanel to the symphysis of the chin, and measures from five to five and a quarter inches, Fig. 15, A, B. This diameter is frequently extended to six inches and even more. When an ordinary-sized head is forced through a contracted pelvis, the head is drawn out so that the circumference is diminished, while it is proportionably increased longitudinally.

The second in length is the occipito-frontal, extending from the middle of the forehead to the occipital protuberance, and measures four to four and a half inches, C, D. This one is often shortened from a quarter to half an inch during labor, by the overlapping of the frontal, parietal and occipital bones.

The short diameter or transverse is called the bi-parietal, and extends from one parietal protuberance to the other, and measures three to three and a half inches, Fig. 16, E, F, from the overlapping of the parietal bones. It is frequently diminished half an inch during labor.

SECTION X.—OF THE DESCENT OF THE HEAD THROUGH THE PELVIS, AND ITS MECHANISM.

Having now studied the pelvis and the foetal head, with their dimensions and proportions, their adaptability to each other, and the mechanism of the descent of the head through the pelvis, are next to claim the attention of the student. How does the head enter, pass through, and escape from the pelvis? The first step to be taken in answering this question is, to get a correct idea of the relative position of the head and chest of the foetus in utero. This once acquired, must be kept perpetually in view, as it is the master-key to the whole process of parturition, and if once deranged, invests it with grave and perplexing difficulties. During the whole of uterine life, after the embryo has become sufficiently developed, let the foetus occupy what other position in the uterus it may, the head is always inclined forwards, with the chin resting upon the breast; this, in all head presentations, makes the vertex, or crown, the most pendent part, and also facilitates the delivery of the head when the other extremity of the trunk presents. This position of the head throws its long diameter in the direction of the cavity of the pelvis, and frees it entirely from any interference with either diameter of its straits. This, then, leaves us but two diameters of the head with which we have to do, in managing a healthy, natural labor, viz., the occipito-frontal, which we will now call the long, and transverse diameters. Now we are prepared to proceed with the demonstration of the proposition before us, and in doing which we shall select the first natural presentation, as the type of all head presentations. This is with the posterior fontanel to the left acetabulum, and the anterior in front of the right sacro-iliac junction, with the sagittal suture running diagonally across the pelvis. This gives us the antero-posterior, occipito-frontal, or long diameter, which is, say four and a half inches, in direction of the oblique diameter of the pelvis, which is five inches and a quar-

ter, leaving in the dry bones a clear space of three quarters of an inch to spare; but in the living subject we find a different condition of things, as the soft structures lining the pelvis occupy at least half an inch of this spare space, and the coverings of the foetal skull absorb nearly, if not quite, the remaining quarter, so in reality, there is but little, if any room to spare; hence were it not for the compressibility of the head, in even trifling deviations from these assumed standards, many a child would perish, and many a woman die undelivered, but this wise provision is beneficently interposed between life and death, and both woman and child are rescued from premature destruction.

The head entering the superior strait, as above described, is forced down through it by the action of the uterus, and enters the cavity. Now it will be recollected that the long diameter of the inferior strait is antero-posterior, instead of lateral, as in the superior; hence the head is now presenting with its antero-posterior, or long diameter with the short diameter of the inferior strait. And here it would be obliged to remain, were it not for the inclined planes formed by the soft structures lining and filling up the irregularities of the interior of the pelvis, forcing it round in its descent, to the extent of the quarter of a circle, which is called the rotary motion of the head, which rotation brings the occiput under the arch of the pubes, and the forehead into the hollow of the sacrum, making the long diameter of the head occupy the corresponding one of the outlet. In this position it can pass from the pelvis, and in its exit the chin leaves the breast, and the occiput mounts the mons veneris, the face sweeping the hollow of the sacrum and the perineum, the chin being the last part of the face to escape from the posterior commissure.

PART SECOND.

CHAPTER I.

ORGANS OF GENERATION.

THESE are twenty-one in number, and are divided into external and internal. Some of them occur in pairs and some singly. There are eleven of the former and ten of the latter.

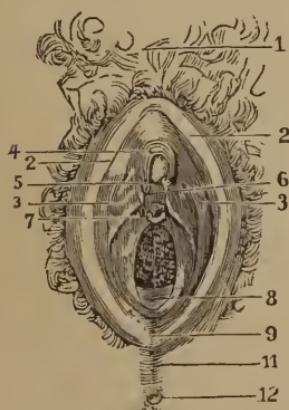
EXTERNAL ORGANS.

There are 1, mons veneris; 2, labia majora, or labia externa pudendi; 2, labia minora, or labia interna, or nymphæ; 1, clitoris with its prepuce; 1, vestibulum; 1, meatus urinarius; 1, fourchette, or posterior commissure, the fossa navicularis; 1, hymen, or carunculae myrtiformes; and 1, perineum.

1. *The Mons Veneris*, mount of Venus, 1. A bold cushion-like protuberance at the inferior part of the abdomen, immediately

over the pubes. It stands like a guard, protecting the assemblage of organs located immediately below it; it consists mainly of the dermoid, areolar and adipose tissues. The former is thick, firm and fibrous, and at puberty becomes covered with a coat of short, thick, coarse hair, which increases in length to full adult age; the skin is largely supplied with sebaceous follicles. The two latter substances of which it is composed vary in quantity in different individuals. In those women inclined to corpulence they are in greater abundance and give a corresponding prominence to the parts,

FIG. 17.



EXTERNAL ORGANS OF GENERATION.

while in thin, spare women the shape is mainly derived from that of the pubes, which it covers. It is rather triangular in shape, and about three inches wide at its upper margin, and about two inches deep.

2. *The Labia Majora, or Labia Externa Pudendi*, the large or external lips of the pudendum, (from pudor, shame,) 2, 2. These are two parallel bodies, formed by the bifurcation of the lower part of the mons veneris, they are a continuation of the structure of the latter, and like it, in some cases, are covered externally with a full supply of hair throughout their whole length, while in others the latter half is but sparsely supplied. The prominence or spareness of these organs also depends upon the general corpulency or leanness of the woman. They extend from the mons veneris to the perineum, lying side by side, and the fissure between them is called the genital fissure. They are, in childless women, about two and a half inches in length; in those who have borne children they are something longer, and the genital fissure is made broader by the labia being somewhat farther separated from each other. The point of bifurcation of the mons veneris is called the anterior commissure, and that of union at the perineum, the posterior commissure, 9. Their direction is from before backwards. They form the most inferior boundary of the trunk, and are almost entirely concealed from view in the erect or sitting posture. The structure of which they are composed is softer and looser than that of the mons, which renders them more distensible; this property they possess in a preëminent degree, being capable of dilating to the extent of thirteen inches in circumference, this being necessary for the passage of the head of a child of ordinary development and size.

From this peculiar structure they are all liable to become the seat of phlegmonous tumors, which become very painful and often require the aid of the surgeon to effect their cure. They are also liable to encysted tumors, which always call for surgical treatment, they are sometimes "subject to purulent collections and also bloody extravasations, serous effusions," &c. They also become the seat of inguinal hernia. Great caution should be observed in the use of the lancet, lest the protruding intestine be punctured instead of a purulent tumor.

They are lined internally with a mucous membrane which is richly supplied with mucous follicles, which furnish mucus for lubricating the parts, and keeping them soft and moist in health. In tropical climates and very hot weather, where a due attention to cleanliness is disregarded, this secretion becomes acrid, producing a distressing and painful irritation. These organs likewise become the seat of a disease termed *pruritis pudendi*, which is manifested by an inordinate and distressing burning and itching, sometimes utterly unendurable.

A remarkable disparity amongst standard authors, in relation to the nomenclature of these parts, exists, which cannot but confuse and perplex the student while learning his first lessons in obstetrics.

For instance, Velpeau, in describing these organs, says: "The slit which they circumscribe, and which is placed in the direction of the coccy-pubic diameter, is called *vulva*, while the whole of the external genitals is specially designated by the word *pudendum*."

Ramsbotham, in describing the same organs, observes: "The whole of the external parts together, as well those lined by mucous membrane as those covered by the common cuticle, are called the VULVA."

Thus what Velpeau designates as the *pudendum*, Ramsbotham calls the VULVA.

Again, Velpeau says: "Between the perineal commissure of the vulva, or greater labia, and the convex edge of the hymen, or posterior semi-circumference of the outer orifice of the vagina, is seen the *fossa navicularis*."

Ramsbotham, in speaking of the *fossa navicularis*, remarks: "A hollow is observed," alluding to the *genital fissure*, "which in the virgin is bound posteriorly by the hymen. This has obtained the name of CONCHIA OR FOSSA NAVICULARIS, and contains within its precincts the clitoris with its prepuce, the nymphæ, the vestibule and the meatus urinarius."

Here we have a disparity that is equally as inexcusable as the former one. Velpeau makes the small space between the posterior commissure and the hymen the *fossa navicularis*, while Ramsbotham assigns to it the entire genital fissure with all its contents. Now from which of these distinguished authors can the student expect

to gain a correct idea of the anatomy of the parts under consideration? As the weight of authority, as Burnes, Dewees, Cazeaux, &c., support Velpeau, his nomenclature as above will be adopted in this work.

3. *The Labia Minora, or Labia Interna, or Nymphæ,* (from νυμφα, nympha, a water-nymph; because it grows in watery places,) 3, 3. The internal or lesser labia are duplicates of the mucous membrane; they are a continuation of the prepuce or foreskin of the clitoris. At their superior part they are broader than below, they lie within and are attached to the greater labia. They generally extend about half way along the genital fissure, gradually diminishing in width from their broadest point until they become imperceptibly lost in the mucous membrane lining the large labia. Sometimes, however, they extend the whole length of the fissure and join each other at a posterior commissure just within that of the external labia.* They are somewhat erectile, and possess a degree of sensitiveness superior to that of the external labia; they are said to contribute to sexual enjoyment.

In early infancy, in consequence of the imperfect development of the external labia, there is a gaping open of the fissure, in which the nymphæ may be seen approaching externally between them. In girlhood they become concealed by the shutting up of the fissure from the enlargement of the external labia, and so remain until child-bearing enlarges the fissure, and also increases their size, when one or both may be seen protruding. At this time of life they are of a brownish color, are less erectile, less sensitive, and seem to have lost many of their early characteristics.

Their principal use appears to be to furnish an additional amount of mucous surface, at the time of parturition, as they become almost, if not entirely obliterated, at the instant of the passage of the child's head through the vulva, and thus, by supplying an increase of mucous surface, prevent a laceration of that structure. Immediately after the birth they again resume their original position, but never regain their primitive condition and appearance.

Many instances are recorded of an hypertrophied condition of these organs. This is sometimes congenital, and sometimes ac-

* We have a fine specimen of this arrangement in our University Museum.

quired. In some countries, as for instance amongst the savage Hottentots, they are naturally much longer than in Europe or America. Their length sometimes is inconveniently great, requiring excision—an operation nowise difficult nor dangerous.

4. *The Clitoris* (from *κλειω*, *kleio*, to enclose or hide, because it is hidden by the labia pudendum), 5, is a small, sensitive organ, like a little tubercle, situated between the nymphæ, at their anterior extremity. It consists of two crura or roots, a body and glands. In its origin, structure and character, it bears a strong resemblance to the *penis masculinum*. It has its origin by its roots from the descending rami of the pubes—these approximate each other and uniting form the body, which is a cavernous substance, and is called the *corpus cavernosum*. This is entirely concealed in the structures between the outer surface and the bone, the only part visible is the glands. Like the penis, it is furnished with a foreskin or prepuce, 4, which covers it anteriorly, and extends down on each side and forms the roots of the nymphæ. The glands is exceedingly sensitive, and is the seat of sexual gratification during coition, at which time it becomes erect and turgid, after which it resumes its flaccidity and want of firmness. The dissimilarity between it and the male penis consists in its diminutive size and the absence of a urethra. It derives its vascularity from the pudic artery, and its nervous supply from the pudic nerves.

In the early months of foetal life it is as large as the penis, at the same period, rendering it impossible to distinguish the sexes. It continues to grow for the first few years of life, and then ceases; according to some authors it diminishes in size from this time towards puberty.

An abnormal irritation of the glans clitoris often gives rise to involuntary sexual desires, resulting in masturbation, prostitution, and even nymphomania. There is no doubt that these unfortunate conditions frequently result from a morbid state of this little organ, requiring medical treatment, rather than unkindness, disownment and censure, which is too often the cruel fate awarded to the erring ones.

The clitoris is sometimes elongated to the extent of several inches, requiring amputation.

The idea of hermaphroditism no doubt owes its origin to such

anomalies, united in some instances, perhaps, with other malformations of the external genitals. There are many strange accounts given of curious constructions of this organism, which a little superstition and a fruitful imagination can readily convert into double-sexed monsters; while many cases that have been represented as such have been proved, upon dissection after death, to be spurious. There are upon record a sufficient number of instances, of genuine malformation of the sexual organs, to establish the fact of the duplex character of the sex of the individual cases, beyond the possibility of doubt; and a very remarkable case of the kind was dissected by Prof. Ackley of Cleveland Medical College, Ohio, and described and delineated by Dr. Blackman, in the American Journal of Medical Science, for July, 1853, p. 66. Externally there were the penis and scrotum, large, well-formed and natural; internally, two testicles, two vasa deferentia, and the prostate gland of the male, all perfect and of the natural size and appearance. Internally, also, were a vagina, os tincæ, a well-formed uterus, two perfect and permeable Fallopian tubes, with their fimbriated extremities near the ovaries of the female. A subsequent dissection of the preserved preparation, by Professor Jackson of Boston, revealed neither a well-defined os tincæ nor ovaries, only a thickening of the tissue in the locality of these organs was observable. It is not usual to find two corresponding organs of the opposite sexes equally developed in the same individual monster. There are on record several similar cases to this, and quite as well authenticated.

5. *Vestibulum*, vestibule, is an unoccupied space between the clitoris anteriorly, and the meatus urinarius posteriorly—lately it is enclosed by the nymphæ; it is triangular in shape. It has no duties to perform in the great work of reproduction, but is of service as a guide to the meatus urinarius, in the operation of introducing the catheter, which should always be done under cover, when at all practicable. The practitioner should be held inexcusable for exposing his patient unnecessarily in relieving the bladder, in case of retention of urine. Sometimes, however, exposure to visual observation is indispensable, when the relative position of the parts is deranged, from tumefaction, as in case of labial ab-

scess, or otherwise. It frequently occurs, that in phlegmonous tumors of the labia, the parts are so swollen and sensitive that the necessary manipulation, under cover, would be productive of too much pain to be endured. The operation, under such circumstances, can be more readily and easily performed by the aid of the sight.

Where it is designed to accomplish it without such assistance, the index finger of the right hand is applied lightly and gently upon the clitoris, the patient lying upon her back or left side; it is then passed posteriorly along the vestibule for about three quarters of an inch, when a slight elevation, of rather firmer texture, will be encountered, in the centre of which will be felt a slight depression; this is the meatus urinarius; the tip of the finger is allowed to remain in the depression, while the catheter, held in the left hand, being first lubricated, is passed along the finger, and made to enter the depression, when, being gently pressed forward, it will readily pass into the bladder. A finger must now be placed over the outer end of the instrument, and there retained, until a proper vessel be provided and placed favorable for the reception of the urine. A flat, shallow vessel is best adapted to this purpose, such as an ordinary saucer or the lid of a common chamber utensil. It has been recommended to open the bladder for the extraction of the stone in females through the vestibule.

6. *Meatus Urinarius and Urethra*, 7. As has already been stated, about three-quarters of an inch posterior to the clitoris, at the posterior extremity of the vestibule, and just anterior to the upper margin of the orifice of the vagina, is situated the meatus or opening to the urethra, which is distinguished by a small tubercle, which a little experience enables one readily to perceive. The urethra is conical in shape, the apex of which is the meatus; it is about one inch and a quarter in length, and differs from that of the male in having neither bulb nor prostate gland. It is curved but very slightly, if at all, in its passage from the meatus to the bladder. It enters the pelvis very close up under the arch of the pubes, and would be subject to serious pressure by the child's head during parturition, did it not pass under the arch at its narrowest part, which is left free from impingement by the head in its descent.

The cavity of the urethra is most contracted at the meatus, and readily admits of the passage of the catheter, after it engages in the orifice. The meatus is capable of great dilatation ; the operation of crushing the stone in the bladder, and its final removal has been successfully accomplished several times through this channel.

7. *The Hymen* (from ὑμέν—*a membrane*) or *Carunculae Myrtiformis*, 8. The hymen is a thin, delicate membranous expansion extending over the posterior third of the vaginal orifice. It is the most interior of the external organs, and divides them from the internal. The importance formerly attached to this little organ was far greater than it ever merited. It was for many centuries regarded, both in morals and in law, as the only test of purity in the unmarried female ; and many a character has been cruelly blasted, and many an unrighteous decision had in the courts, on account of its not being present, where its absence occurred in celibacy, and was regarded of course as the result of criminality. At the present time its importance is unduly estimated amongst the vulgar, and disagreeable suspicions are often excited when its absence is discovered upon the first matrimonial embrace ; as the popular belief is, it is destroyed at the first copulative act, and the absence of expected resistance in the parts is taken by the young husband as evidence of previous intercourse, and all his bright fancies of enjoying the unsullied purity of his young wife vanish, and give place to gloom and mortification, which often mar all the subsequent enjoyments of life, and rob it of its dearest rites.

During the seventeenth and eighteenth centuries its presence in the new-born female infant was admitted by some and rejected by others. At the present time the weight of authority preponderates greatly in favor of its being of uniform existence in early infancy. But its extreme tenacity and friability, in many instances, are so great that it becomes destroyed from the slightest cause. There is nothing more common during the hot weather of summer, where a due regard to cleanliness is not strictly observed, than the labia of children becoming the seat of irritation and inflammation, causing an itching and burning of the parts, to relieve

which the little patient embraces every favorable opportunity to indulge in rubbing and scratching them, which operation is often extended within the labia, even to the orifice of the vagina, and during which the hymen is unconsciously and innocently destroyed. This cause of its destruction is so common, and the result so frequent, that many anatomists have denied its existence as a uniform consequence, but rather regard it as an accidental or adventitious development. The introduction of a pessary destroys the hymen. On the other hand it occasionally occurs that the membrane is so thick and tough as to resist almost any amount of violence, and being distensible with all, it allows not only of one copulative act, but many, and remains entire. Instances are recorded of its existing unharmed, even after the birth of a child. In these cases it is naturally small, tough, and distensible, allowing itself to be pushed aside by the penis in copulation, and the child's head in parturition, without being ruptured. These facts show its entire worthlessness, as a test of virginity, and that it may be absent without a violation of chastity, and present with a character stained and blackened by prostitution. It therefore becomes the moral duty of every right-minded physician, whenever an opportunity presents itself, to endeavor to correct this popular error, and by spreading more accurate information upon this delicate subject, extend to suffering women the arm of protection, and to the domestic circle the elements of mutual confidence and conjugal felicity.

The membrane is usually crescent or semi-lunar shape, with the concavity looking forward; sometimes the horns extend around the side of the vaginal orifice, and meet just below the meatus urinarius, forming a circle around the opening. Sometimes it spreads over the entire orifice, and is perforated with a number of small openings, giving it a cribriform appearance, at other times it extends over the entire orifice and is imperforate. When this occurs, and it is sufficiently strong, it arrests the catamenial flow, which sometimes accumulates for months and even years, producing a train of symptoms analogous to those of pregnancy, but ultimately becoming far more severe, are made the subject of medical investigation; relief is instantly afforded by making an incision

through the hymen and allowing the accumulated fluid to escape.*

* The following remarkable case of imperforate hymen came under the observation of the author since the foregoing was written; and was reported for the University Medical and Surgical Journal, of April 1, 1867.

On the 3d of March, the present year, I was called to a young lady of this city, aged 16 years and 6 months. She was suffering greatly from an extreme aching through the pelvis, back, and hips, with a distressing bearing-down sensation, and sense of fullness. Upon inquiry I found she had never menstruated. Though rather below the medium stature, she was well developed. The skin naturally fair, was rather tawny, the eyes presented a dull lustreless appearance. Her general health had been as good as usual, and she had usually manifested the vivacity of spirits incident to her age and position in society.

Symptoms of menstruation appeared about her fourteenth year, and recurred regularly at proper intervals, attended with no other inconveniences, than a slight headache, and the usual uneasiness through the back and hips, lasting three or four days, each time.

About the 1st of January, 1866, while on a visit at home, from boarding school, during Christmas holidays, she had the first attack, sufficient to excite serious apprehensions in regard to her condition, though she suffered considerable pain, and had some slight febrile symptoms, yet the case was not considered sufficiently urgent to require the attention of a physician. A few domestic remedies were employed, and in about the usual time, the symptoms disappeared, and she was apparently as well as common. In about three months, she had another similar attack; during the intervals between these two severer ones, she had her usual monthly complainings. From the first of these severe attacks, up to the time I was called to see her, she had them every third month, each succeeding one being worse than the former, the intervening monthly periods presenting no unusual phenomena. In the meantime, the attention of a physician was directed to her case, which was regarded by him as one of painful amenorrhœa, though her mother, who was not unintelligent on the subject, expressed to him her apprehension of the real cause of the difficulty, her frequently expressed suspicions were disregarded, and the case treated with narcotics, counter-irritants, fomentations, &c., &c., trusting to nature to ultimately bring matters right.

When I first saw the patient she was suffering with the ordinary symptoms of dysmenorrhœa, excepting the non-evacuation. I prescribed tinct. of opii, camphor, capsicum, of each, half an ounce, with directions to take a teaspoonful every hour with warm fomentations over the lower abdomen and a warm, stimulating pediluvium.

I mentioned to the mother, my apprehensions of a mechanical obstruction, somewhere along the utero-vaginal passages. She told me such had been her fears for some months and that she had mentioned it to Dr. ——. An examination at that time was deferred at the mother's request, she desiring first to prepare the patient's mind for the ordeal. I was informed that for several months there had been a gradual enlargement of the abdomen, so much so that her clothes had required enlarging several times.

I called late in the afternoon, and found the patient no better, the medicine having produced nausea and vomiting. Prescribed morph. sulph., four grains; aqua font. two ounces; with directions to take a teaspoonful every hour, until relieved.

March 4th.—The patient passed a restless night, having obtained but a few minutes sleep, suffering, if possible, more than the previous evening. Had voided no urine during the night. Felt a little uneasiness from the retention. Prescribed, ext. hyoscyam. five grains; dioscorin, ten grains; divide into five pills; take one every hour.

The Caruncula Myrtiformis consists of a number of small bodies, as their name indicates, resembling myrtleberries, situated in the site of the hymen, and supposed by some to be the remains of that organ after its destruction. Others hold that they are independent developments, having been found coëxistent with the hymen. So far as their having any practical bearing is concerned, it is of little consequence which hypothesis be adopted.

9. *The Fossa Naviculare*, 9. The space between the fourchette

Considerable relief followed the administration of the first dose, for a short time. At noon saw the patient again; suffering returned, augmented by pain from retention of urine. Directed a continuance of last prescription, with the free use of watermelon-seed tea, and a warm sitz-bath.

Was summoned again, at four o'clock, in the afternoon, found the patient in the most intense agony. Proceeded to introduce the catheter; the vulva was pressed strongly outwards, by a propelling force from within; comparable to the condition of the parts, when the child's head is pressing forwards, just before the labia begins to separate during parturition. The parts excessively sensitive. Introduced the catheter, half an inch into the urethra, found it obstructed, force sufficient to pass it, caused excruciating pain, was obliged to desist. Administered chloroform, by inhalation, until its full effects were induced; then introduced the catheter; the obstruction, caused by the urethra being compressed between the enormously extended vagina and the arch of the pubes, was easily overcome, and nearly two quarts of urine were drawn off. Attention was next directed to the cause of the catamenial obstruction. Upon separating the labia, a large, round, firm, but elastic tumor presented itself. The presenting part (the hymen) was tough, dense and very strong; there was considerable capillary engorgements of the hymen and adjacent parts. A small puncture was first made; the structure affording no trifling resistance to the point of the instrument. Through the puncture escaped a thick, dark viscid matter, about the consistence of treacle. Having determined the precise character of the tumor, the hymen was divided throughout its whole extent, requiring an incision, on account of its great distention, about three inches in length; from which gushed a full stream of this viscid menstrual fluid, that had been accumulating for two and a half years. The quantity that escaped during the evening was estimated at four quarts. Nor will it be thought over estimated, when it is taken into consideration, that in two and a half years, there are 34 menstrual periods, allowing one to every 28 days. And 4 ounces of fluid eliminated at each period, will make 136 ounces, or $4\frac{1}{2}$ quarts. Add to the four quarts of confined menstrual fluid, the two quarts of urine, and we have the enormous quantity of six quarts, or a gallon and a half of fluid, contained in the bladder and utero-vaginal cavities, at one time. It is almost incredible, that an amount of distention could be attained, sufficient to hold this quantity of fluid, without causing more permanent injury, than the patient, in this instance, sustained.

As soon as the effects of the chloroform passed off, her gratitude could find no expression in words, for being delivered from such agonizing torture in so short a time. She soon fell into a profound sleep, (from which she was only aroused occasionally, to give her a little nourishment), which continued for twenty-four hours. She came out of her sleep, feeling quite well, complaining only of weakness. She kept her bed four days, and is now feeling much better, lighter and more natural, than she has for the last two years. The sallowness of the skin has disappeared. She is well.

and hymen is known as the fossa navicularis (from *navicula*, a boat—the boat-shaped fossa). It is a small depression of only about half an inch in extent. It is the counterpart of the vestibule, the latter forming the anterior, and the former the posterior boundary of the vulva. It is usually obliterated during the first parturition.

10. *The Fourchette and Posterior Commissure*, 10. At the posterior extremity of the labia majora, the mucous membrane lining them is thrown into a fold, which extends from near the extreme termination of one labium to that of the other, like a frænum or bridle, and is called the fourchette or fork. This is usually ruptured during the first parturient struggle, and as it forms the anterior border of the fossa navicularis, its distinctive character is abolished at the same time. The laceration of the fourchette sometimes extends to the commissure and involves also the perineum, producing disastrous consequences.

The point of union of the greater labia at their posterior extremity is called the posterior commissure. It forms an intimate relation with the anterior extremity of the perineum, with which it is identified, and derives its importance from the circumstance of its being the point at which a laceration of the perineum commences during the last throes of labor.

The Perineum, (11 from *περινεω*, *perineo*, to flow round, because that part is generally moist) the space between the anus, 12, and the posterior commissure. This organ is common to both sexes, but on account of its great importance in an obstetrical point of view, authors are pretty well united in classing it among the female organs of generation. Obstetrically considered, the perineum includes all the space between the posterior commissure and the point of the coccyx, and between the tuberosities of the ischia. The perineum is composed of deep-seated muscles, underlying a stratum of loose cellular tissue, which is but sparingly supplied with fat, and the external skin. Its entire length from the posterior commissure to the point of the coccyx is about two inches in the quiescent state; but from the highly distensible character of the structure, it is capable, under pressure by the advancing head during labor, of being extended to four or five inches. The thickness of the structure is diminished in ratio to the increased length

of the organ, and at the instant of the escape of the head from the vulva, the perineum at the posterior commissure will be found extremely attenuated, so much so sometimes as to give way, making a fearful rent throughout a part or the whole extent of the perineum. These accidents are great misfortunes to the victims of them, sometimes requiring months before they recover, during which time much suffering is endured, and not unfrequently permanent, life-long injury sustained therefrom.

In order to guard against this disaster, it is recommended to support the perineum by a firm pressure upon it during the escape of the head through the vulva, with the palm of the hand, covered with a folded napkin. There is great unanimity amongst authors in regard to this recommendation, but when the matter is viewed either in the light of mechanics or physiology, the conviction cannot be resisted, that the manœuvre is based upon a wrong theory, and is pernicious in practice. While there is entertained a due deference for, and an exalted appreciation of, the genius and learning of the distinguished accoucheurs who insist upon this precautionary measure, it cannot be denied, upon due reflection, that it is opposed by both theory and facts. This point will be further elucidated after the student shall have become more familiar with the mechanism and physiology of labor.

CHAPTER II.

INTERNAL ORGANS OF GENERATION.

THE ten organs entering into this assemblage are as follows, viz.: 1 vagina, 1 uterus, 2 ovaria, 2 fallopian tubes, 2 broad ligaments, and 2 round ligaments. The latter six occurring in pairs, are called the *uterine appendages*, or the appendages of the uterus.

THE PARTICULAR ORGANS.

1. *The Vagina*, 1, is a membranous canal, extending from the hymen or caruncula myrtiformis to the os uteri. It passes up

through the outlet of the pelvis, with the bladder, 2, anterior, and the rectum, 3, posterior to it. It is somewhat conical in shape with the smallest part at the orifice below, 4. Following the axes of the inferior strait of the pelvis, its course is slightly curved, in consequence of which the posterior wall is about three inches, and its diameter one inch, in the virgin state; it va-

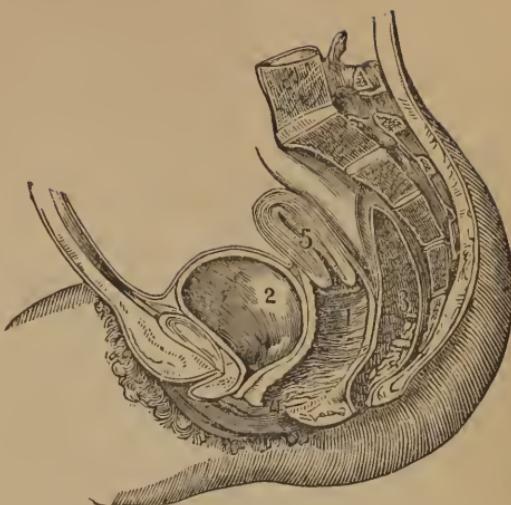
ries in length under different circumstances. During the first three months of pregnancy it is shortened by the descent of the uterus, while during the last four months it is prolonged by the ascent of that organ above the brim.

The posterior wall is united to the posterior lip of the os uteri, even with it, as though the two organs were a continuation of the same structure; the anterior wall extends up a few lines above the anterior lip, and forms its attachment, leaving the lip clear, below the insertion.

It has two coats, the mucous and muscular, and some authors ascribe to it a third, and call it the cellular. This is not a distinct coat, but merely a collection of cellular tissue by which it is surrounded, and by means of which it is united to the adjacent structures.

The mucous coat, which is a continuation of the mucous membrane lining the external organs, forms its entire internal lining. In those women who have not given birth to children, it is corrugated, lying in transverse folds; these are more numerous towards the orifice than higher up. These folds do not extend all the way round, but terminate in the columns of the vagina; these are two, three, or four in number. They consist of longitudinal folds of the

FIG. 18.



INTERNAL ORGANS OF GENERATION.

mucous membrane; between these columns the transverse rugæ or folds are seen extending from one column to another. They are much more numerous in infancy and childhood; many of them disappear after puberty, leaving the upper part of the vagina nearly smooth; their number still further diminishes after child-bearing, but they are never entirely obliterated. On account of this rugous arrangement, it has been called the *rugous coat*. This coat is very vascular, and is supplied with blood from the uterine arteries. It owes its sensibility to a liberal supply of nerves from the sacral plexus. It is furnished with an abundance of mucous follicles, by means of which the parts are kept lubricated and moist, and which, in a state of excitement, emit a large quantity of mucus.

This membrane being so highly organized is liable to attacks of disease, and instances are not wanting where adhesions of the walls have resulted from inflammation and ulceration. It is liable also to morbid conditions giving rise to a distressing and exhausting leucorrhœa.

The use of these organs are alleged to be: 1. To contribute to venereal gratification; 2. That these folds serve to give greater amplitude to the cavity by stretching out, during labor, and thus preventing laceration.

The muscular coat consists of a tolerably well-developed layer of muscular fibres, which run in various directions,—some longitudinally, some diagonally, and others circularly. The circular fibres are found more abundantly at the outer end of the canal, and in some cases they are so compactly arranged around the orifice as to form a sphincter, which has been alleged is under the control of the will, and is made to dilate and contract at pleasure. The late Dr. Parrish had a patient who was able to retain vaginal injections, by means of the voluntary contraction of this muscle. It is so frequent in its occurrence, and so well defined, that Anatomists have given it the name of *sphincter vaginæ*.

The structure of the vagina renders it extremely distensible; so much so, that during the passage of the child's head through it, its circumference is enlarged to the extent of thirteen inches, while in the quiescent state it does not exceed three.

It is connected by the middle three-fifths posteriorly to the rectum, forming the recto-vaginal septum. The superior fifth is

covered by the peritoneum; its inferior fifth separates from the rectum, and approaches the vulva, leaving the perineum between them.

Anteriorly it is connected by means of dense cellular tissue to the bladder and urethra, forming the cisto-vaginal and urethro-vaginal septa.

The cavity of the vagina is flat, antero-posteriorly, and not vertically, as might be inferred by the direction of the genital fissure. The vertical direction is only preserved by the external organs. The antero-posterior walls of the organ proximate, and lie in contact with each other, and not the lateral ones. This fact is important when viewed in its relation to the use of the bivalved speculum. In employing this instrument, after its being introduced, the handle must be turned towards one thigh or the other, so that when they are pressed together the valves may separate in the antero-posterior direction, thus separating the antero-posterior walls, and leaving a clear view of the os uteri. While, if the blades were separated laterally, the antero-posterior walls would fall in between them, and obstruct the view entirely.

The orifice of the vagina is surrounded by a ring of erectile tissue. The vagina assists in supporting the uterus in its position in the pelvis.

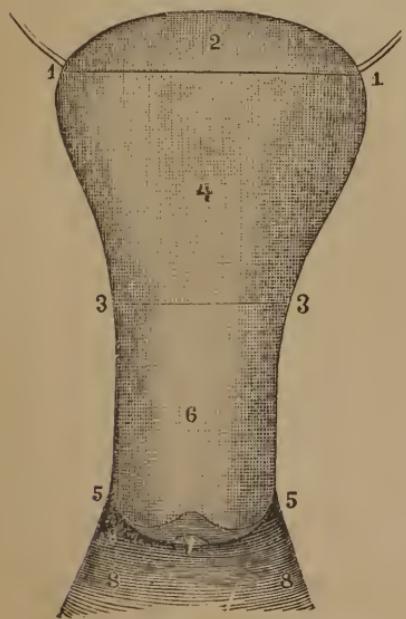
2. The *Uterus*, (from *ὔστερα*, *Usteria*), *Matrix*, or *Womb*, 5, is located in the centre of the cavity of the pelvis, between the bladder anteriorly and the rectum posteriorly. Its position is in the direction of the axis of the superior strait, the os or mouth looking downwards and backwards, and the fundus upwards and forwards. It inclines forwards, at an angle with the axis of the vagina of about sixty degrees. Its upper margin or fundus is on a level with the brim of the pelvis, and its lower extremity, the os, is two and a half inches from the vulva, dipping down about half or three-quarters of an inch in the upper part of the vagina towards the hollow of the sacrum.

Its median line is rather to the right of the median line of the pelvis. This inclination to the right is accounted for by some authors, from the fact of the rectum passing down a little to the left of the pelvic median line, and thus shoving the uterus over to the right; others aver that it is because the round ligament of the

right side is shorter and stouter, than that of the left, and that it is drawn over by it. Perhaps it may be owing to a combination of both these causes.

Its shape is rather triangular and has been compared to that of a flattened pear or gourd. In the virgin, at maturity, it is about two and a half inches long—and about one inch and a quarter wide at its broadest part and from a half to three-quarters of an inch in thickness. Its weight is from eight to twelve drachms. Its upper anterior, third, fundus, and entire posterior face is covered by the peritoneum which extends down below the os, and over the upper fifth of the vagina, whence it is reflected upon the rectum, forming what is known as the recto-vaginal cul-de-sac. The remaining two-thirds of the body anteriorly, and the entire neck, is attached to the bladder by cellular tissue. It is strongly convex on the posterior face of the body, and from its attachment to the bladder, the anterior face is more flattened, which difference enables the student to distinguish the right from the left side in examining it.

FIG. 19.



THE UTERUS.

Anterior to puberty, the uterus lies in a perfectly quiescent state. It is much smaller than it is subsequently to that epoch, and possesses an organization barely sufficient for the purposes of vitality. At puberty it springs, as it were, into new life, becomes enlarged in all its diameters, assumes its legitimate functions, and continues in a state of activity for thirty years of woman's life. At or about forty-five its functions cease, and it gradually subsides into its primitive condition; so that the uterus of a very old woman, presents characteristics similar to those of one in a very young girl, alike in size, weight, appearance, and absence of function.

For the sake of convenience in describing it, anatomists have divided it into four different parts or regions. These dividing lines are entirely arbitrary, there being no natural divisions except the mouth, or what is termed the os uteri. That part above a line drawn from the insertion of one Fallopian tube to the other, at the upper angles, Fig. 19, 1, 1, is the fundus, 2. The part between this line and one drawn from one side of the upper portion of the narrow part below, to the other, 3, 3, is the body, 4. The part between this last line, and the inferior extremity of the organ, 5, 5, is the neck or cervix, 6; and, at the most inferior extremity of the neck, is the os uteri, 7. That portion of the figure below the neck represents the upper part of the vagina, 8, 8.

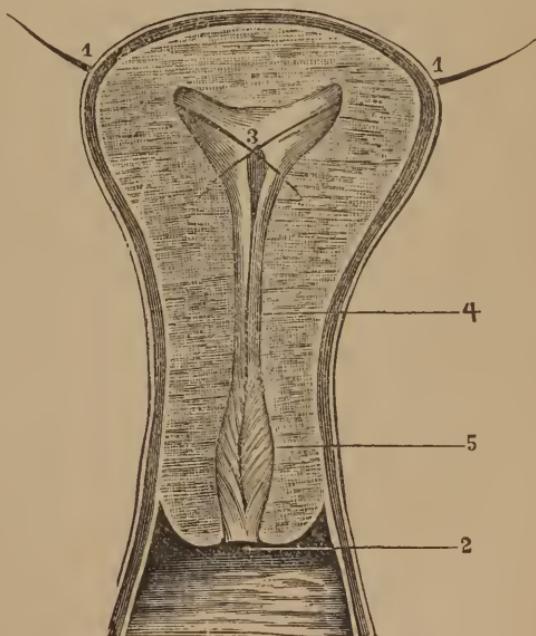
The uterus is destined to receive, lodge, sustain, and in due time expel the ovum. On account of this office it is to be regarded as the organ of gestation rather than one of generation.

A living female writer has quaintly remarked of it, that "it is the nest of the world, and the curse of woman."

It being the incubating organ, the aptness of the first title is apparent, and the many diseases, derangements and displacements to which it is subject, with their long train of suffering, fully justifies the second.

The Cavity. The uterine cavity is triangular, and large enough to contain a split almond. Each angle is marked by an aperture, the two upper ones, by the entrance of the Fallopian tubes, Fig. 20, 1, 1, and the inferior one by the os uteri, 2. The opening of the Fallopian

FIG. 20.



THE CAVITY OF THE BODY AND NECK.

tubes are not at right angles with the body, but enter the cavity obliquely, so that two bristles passed down through the tubes into the uterus, will cross each other at a considerable angle, 3.

The cavity is lined by a mucous membrane, a continuation of that lining the vagina. This lining structure, is very difficult to observe in the unimpregnated uterus, and this circumstance has led some Anatomists to deny its existence, but in the gravid state it becomes so well defined as not to admit of a doubt as to its presence. In the cavity of the neck this membrane is deposited in folds bearing a similitude to the branch of a shrub, and from this arborescent arrangement has been called the *Arbor Vita*. In infants the whole membrane is corrugated. The cavity of the neck differs from that of the body, in being round instead of flat. That point of the cavity where the body terminates and the neck begins, is known as the os internum, or internal mouth. Below the os internum the neck expands, 5, and converges at the os externum.

The *Os Uteri*, called also the *Os Tincæ*, from its resemblance to the mouth of the tench fish, Fig. 18, 7. In the virgin uterus the os presents a small round or oval aperture, about large enough to receive a crow's quill with ease. This being the only part of the organ accessible to the touch or vision, and that through which much of the practitioner's information, relative to the position and condition of the organ, is to be derived, is possessed of peculiar interest, and requires to be thoroughly studied. By its position in the pelvis we ascertain the position of the uterus, whether normal or otherwise. It also presents valuable diagnostic marks indicating pregnancy. And, by means of the speculum, we are able to see there the cause of many severe constitutional symptoms, otherwise obscure and incomprehensible.

At the upper portion of the vagina, towards the back part of the pelvis, upon examination, will be felt, extending down a short distance, a round, smooth body, possessing much greater density than the surrounding structures; this is the most pendent part of the cervix uteri, that portion below the insertion of the vagina. In the centre of this presenting body will be discovered a small depression, nearly round, or rather slightly oval, with its long diameter transverse; this is the os uteri, which, to the inexperienced

touch, will be likely to remain unobserved, unless great care and attention is bestowed upon the search.

In women who have borne one or more children the os uteri presents a very different condition. Here the presenting part of the neck is much enlarged, and the depression of the os guarded by two pouting lips, one anterior and one posterior, presenting a strongly marked transverse fissure between them. This divergence from the condition of the virgin uterus is greater in proportion to the number of children the woman may have had. The anterior lip is thicker, broader and perhaps slightly longer than the posterior one. But in consequence of the union of the vagina with the posterior lip, instead of above it, as in case of the anterior, it has the appearance of being prolonged, and hence it has been called the long lip of the os uteri.

There are a great number of mucus glands situated about the cervix and os uteri, known as the Nabothian glands, called so in honor of their discoverer, Naboth. When under the excitement of labor they furnish a bountiful supply of mucus, for lubricating and softening the parts. This mucus thus profusely secreted, during the dilating stage, slightly tinged with blood, constitutes what is technically called "the show," and indicates the actual commencement of labor.

The os and cervix uteri are occasionally congenitally impervious; and sometimes they are rendered so by adhesions resulting from previous inflammation.

The Structure of the Uterus. Between the investing serous and lining mucous membranes is the substance or *parenchyma* of the organ. This constitutes its most essential and fundamental part. Of the precise nature of this structure there have been entertained very many and opposing opinions. Like everything else in science and philosophy, that has not been tested by experiment and proved by demonstration, it has given rise to much discussion and not a little acrimony, with but very little benefit to the world. It has been declared to be a *gland*, and referred to the glandular system. Others have insisted on its being a structure *sui generis*, while a third party have decided on its muscularity. On this point there have been arrayed in opposition some of the greatest minds that ever investigated any subject, either physics or metaphysics,

science or theology. Some alleging it to be a hollow muscle and others denying the allegation. This war of opinions was finally put to rest forever by the dissections of Bell, Vesalius, Malpighi, Ruysch, Hunter, Madame Boivin, Velpeau, and quite recently of M. Deville.

The walls of the unimpregnated uterus are about a quarter or three-eighths of an inch in thickness. They are exceedingly dense and firm, with no appearance of muscular fibres, the structure has been compared in texture and appearance to that of half tanned sole leather—a comparison not wanting in aptness. It is light colored and apparently semi-cartilaginous in texture. It possesses a very low degree of vascularity, and its nerves and lymphatics are very small. In accordance with its low degree of organization, its sensibility in a normal state is very obtuse, so much so that Dr. Gibson, late professor of surgery in the University of Pennsylvania, regarded it as an insensible organ. In some forms of disease, however, it manifests extreme sensibility, as well as sometimes during pregnancy. Pregnancy works an astonishing change in the character of this structure; and the most favorable time for studying it is towards the termination of gestation; then the tissues are all augmented and rendered perfectly appreciable. The blood vessels, hitherto too small to be detected by the unassisted eye, now become great sinuses, transmitting torrents of blood; the nerves, so diminutive as to render their presence almost doubtful, are now transformed into perceptible cords, and are seen traversing the structure in various directions, and the lymphatics, too, become so enlarged as to render them plainly visible and their cause and destination obvious. But the greatest modification of all, perhaps, takes place in the muscular tissue of the organ.

As Cazeaux has given as graphic yet concise a description of the distribution of the muscular fibres of the uterus as can be given in our language, it is thought best to tender to that distinguished author an acknowledgment of indebtedness, for liberal extracts from his great work on midwifery, on the point under consideration, and also for a copy of his drawings in illustration thereof.

“From the able researches of Madame Boivin the following disposition of these muscular fibres has been determined. She

describes two planes of fibres as existing in the body of the uterus — the one exterior and the other interior. The external plane is composed of fibres which run from the middle line outwards and downwards, to the inferior third of the organ, where they terminate upon and aid in forming the round ligaments situated there, while the most superior ones are distributed to the Fallopian tubes and the ligaments of the ovary. An exact idea of the radiated disposition of the external fibrous planes, at the superior and lateral parts of this organ, may be formed by imagining the long hair of the human head to be parted along the whole middle line of the cranium, and then combed smoothly on each side in front, and tied very tight opposite each ear, Fig. 21.

"Another muscular plane is found internally, having an entirely different arrangement; these fibres are circular and situated at the superior angles of the womb. They surround the internal orifice of the tubes, 1, 1, Fig. 22, describing concentric circles, at first very small and close but gradually separating as the distance from the angle increases, so that the last and largest border is upon the median line, and spread out in the direction of its length.

"Between these two planes (the external one composed of lon-

FIG. 21.



DISPOSITION OF THE MUSCULAR FIBRES ON THE ANTERIOR FACE OF THE WOMB.

FIG. 22.

MUSCULAR FIBRES OF THE UTERUS, 1, 1,
THE INTERIOR ORIFICE OF THE FALLOPIAN
TUBES.

gitudinal, and the internal one of horizontal fibres,) some other muscular fibres are found, but it is impossible to trace their course.

“Only a single order of fibres, which are semi-circular in their character, exist at the inferior part. They commence at the median line of this region, and re-unite on the sides near the round ligaments.

“I will remark, in terminating this short account of the uterine structure, its great resemblance to that of all the hollow organs, in having, for instance, its longitudinal fibres on the exterior, whilst the circular and horizontal ones are found internally. The fundus uteri is the part particularly concerned in the expulsion of the foetus, and it is there also the muscular apparatus is the most developed; and its disposition is such, that all parts of the uterine surface tend towards the centre during contraction. Lastly, at the inferior part, where the resistance should be the least, there are only the horizontal fibres, constituting a sort of sphincter muscle, which may be compared, on more than one account, to the sphincter of the rectum or bladder.

“Quite recently M. Deville, Adjunct of Anatomy to the Facultie de Paris, after having studied the muscular arrangement of the organ in a great number of uteri, taken from females who died a few days after their accouchements, has arrived at some very different results from those previously acknowledged. He has kindly exhibited his dissections to me, and I confess, after an attentive examination, that it were impossible for me not to be of his opinion. This subject, in my estimation, requires a new examination; but whilst awaiting an opportunity of dissecting myself, the preparations of M. Deville appear so satisfactory, that I have obtained a drawing of them, and introduce here the description furnished by that skilful Anatomist.

“Examined on its external surface, after the removal of the peritoneum and the compact resisting layer that separates this serous coat from the muscular fibres, the uterus seems to be composed of two orders of fibres, which are essentially muscular in character, one being transverse, and other longitudinal.

“The transverse fibres arise (attaching purely a descriptive meaning to this word) from these sources: the round ligament,—

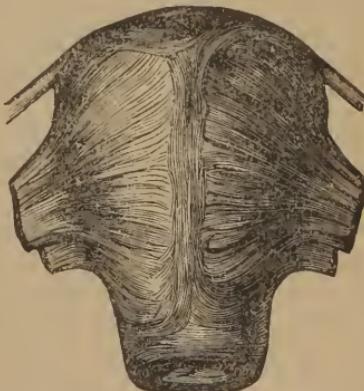
Fallopian tubes, the ligament of the ovary, and the wings of the corresponding broad ligament; and it merely requires the removal of the delicate peritoneal envelop of these organs to bring into view the transverse fibres, and to convince one's self of their muscular nature.

"The transverse fibres, joined with certain vessels and nerves, constitute the intimate structure of the round and ovarian ligament, as well as the middle layer of the Fallopian tube, which is therefore, essentially muscular, just the same as the internal membrane (improperly called the dartos) of all the excretory canals.

"The presence of a great number of transverse uterine fibres in the broad ligament, lying in the thickness of its folds, and extending even down to its base, is an important fact to be borne in mind; and the question arises, where do they terminate? But I have not yet been able to determine this in a satisfactory manner. However that point may be, the transverse fibres coming from these divers organs, spread out in a radiated manner over the whole exterior surface of the uterus, the anterior or posterior ones transversely, or a little downwards in an oblique direction, and the superior obliquely upwards, so as to cover the organ completely.

"Near the median line, these fibres are crossed perpendicularly to their course, by a longitudinal faciculus, more or less sinuous in character, and three-eighths to three-fourths of an inch wide, which arises near the point of union of the body with the neck, ascends upon the fundus of the organ, and descends on the posterior face, to be lost at its inferior part, opposite to, or a little below the point of beginning, that is, near the union of the body with the neck. A positive continuity will be observed between the transverse fibres on each side, and the middle longitudinal faciculus, if the line of contact be carefully examined.

FIG. 23.

DISPOSITION OF THE MUSCULAR FIBRES ON
THE POSTERIOR FACE OF UTERUS.

"As the transverse fibres arise near the middle line, some curve downwards, others upwards, so as to become longitudinal, and this constitutes the median layer. This is particularly evident at its termination, both in front and behind, for the whole faciculus divides there into two portions, one of which curves to the right, the other to the left, and becomes continuous with the most inferior transverse fibres of the body.

"This continual exchange of the two series of uterine fibres takes place with such great uniformity, that the longitudinal faciculus has nearly the same thickness everywhere; but if this lamina be more patiently examined, it will only exhibit some short longitudinal fibres, forming the central part of the letter X, which the uterine fibres describe, as I have verified on many of my preparations, in the following manner:

"Let us take a layer of the transverse fibres on the *right* side of the uterus, on the anterior inferior part (vide Fig. 21): this faciculus nearly approaches the median line, then curves upwards and becomes confounded with the longitudinal lamina; then, after a vertical course, varying from one-third of an inch, it again curves to the *left*, to resume a transverse direction, thus representing a Z, or, still more exactly, a branch of the letter X.

"Thus, the longitudinal median layer is produced by the union of the central and vertical branches of the X, described by the uterine fibres.

"It sometimes happens, however, that the transverse fibres pass directly from the right to the left, without forming the vertical branch, which fact should be borne in mind, lest the arrangement existing on the surface might give rise to a belief of the absence of a median longitudinal faciculus; whereas, if the latter is not evident, it will be only necessary to raise carefully this layer of the median transverse fibres, to bring it into view. The uterus exhibits the same disposition of the muscular fibres on the internal face, which will readily account for the error of Madame Boivin, who described them as circular.

"Notable differences, however, exist between the fibres on the two surfaces of the organ. The most remarkable on the exterior (interior?) is the extreme breadth of the longitudinal faciculus, which

covers the whole fundus, extending from the orifice of the Fallopian tubes on one side, to the same point on the other. When this faciculus reaches the anterior and posterior face, it is intersected at right angles by the transverse fibres, occupying the lateral position just below the exterior surface; that is, some of the fibres curve upwards, others downwards, becoming confounded with the longitudinal layer. Lower down, near the junction of the body with the neck, the longitudinal faciculus is very irregular. Sometimes it exists; sometimes (though more rarely) it does not. At this point, in fact, the continuation, or inter-crossing of the transverse fibres from one side to the other, occurs in an irregular manner, either forming the vertical branches of an X, or taking an oblique direction, or again going directly across, the fibres preserving a transverse course.

"A third layer exists between the two just described, but I am not sufficiently acquainted with the disposition of its fibres, to give an exact account of them.

"All these particular details do not interfere with the great law of *inter-crossing*, or passage of uterine fibres from one side to the other, and in this respect the uterus may justly be ranged in the same class as all the other hollow muscular organs, whose structure is also regulated by the fundamental law of *muscular inter-crossing*. Hence, it would not be difficult to demonstrate that the human uterus, as just described, approaches in its structure, quite as well, perhaps better, to that of the same organ in *mamifera*, than the arrangement pointed out by Madame Boivin. But such discussion would be out of place here.

"In conclusion, I will observe, that the same disposition in the muscular arrangement is found in the neck and inferior parts of the body. Inter-crossings occur there also, the fibres passing directly from one side to the other, or becoming more or less oblique at the moment of crossing, and still oftener forming the branches of an X with the median vertical parts. This last dispo-

FIG. 24.

SHOWS THE INTERLOCKING OF
THE UTERINE FIBRES.

sition gives rise to the peculiar formation which has improperly been called the *Arbor Vita.*"

The blood supplying the uterus, is derived from two sets of arteries, viz.: the *uterine arteries*, that are given off by the hypogastrics, and the *ovarian arteries*, furnished by the aorta or the emulgents. The first enter the substance of the uterus, near the neck, and the second above; these arteries ramify and inosculate with each other. In consequence of the density of the structures they traverse, they are extremely tortuous, and are frequently doubled and redoubled on themselves several times. Their accompanying veins, empty by their trunks into the internal iliac and ovarian veins.

The Nerves of the Uterus are derived mainly from the sacral plexus of the cerebro-spinal system, the great sympathetic, the hypogastric and spermatic plexuses. Further attention will be given to the nerves of the reproductive system hereafter.

THE ABSORBENTS run in two directions: one into the lumbar and sacral glands, and the other into the glands of the groin.

The weight of the uterus, in the quiescent state, after several pregnancies, is increased to two ounces.

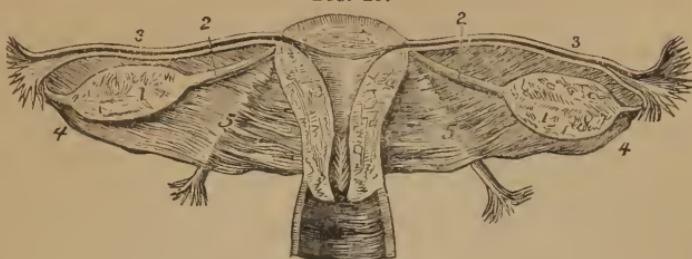
The Uterine supports. The uterus is sustained in its proper position in the pelvis by its ligamentous appendages, viz.: two broad ligaments, two round ligaments laterly, and by the vagina below.

3. THE OVARIES.—*Ovarium*, (derivative of *Ovum*, egg.) *Testes, Muliebres.* In alluding to the reproductive apparatus, it is customary to give the uterus the commanding position, and to speak of "the uterus and its appendages," while, if the organs ranked according to their importance, the ovaries would assume the major position, and the expression would be, "the ovaries and their appendages." The ovaries are two small glandular bodies, enveloped in the posterior wing of the broad ligament. They are about one inch in length, and half an inch wide at their broadest part, and, in some instances, nearly half an inch in thickness, but generally not so much.

They are situated on each side of the uterus, about one inch and a quarter from the superior angles, Fig. 24, 1, 1, to which they are attached by impervious cords, called the ovarian ligaments, 2, 2.

The ovarian ligaments are a continuation of the uterine fibres, and leave the uterus a little below the inner extremity of the Fallopian

FIG. 25.



tubes, where they enter the uterus. They are maintained in their position by these ligaments, and the broad ligaments in which they are enveloped. While the uterus remains unimpregnated, and unaffected by disease or morbid growth, they may be found occupying the iliac fossa; during pregnancy they are influenced by the different positions of that organ, and during the latter part of gestation are carried high up in the abdomen.

Previous to the time of Steno, they were regarded as the *female testes*, and were supposed to secrete a fluid similar to the male semen.

They are of a light color, and the surface is marked by a number of indentations or fissures. They are oval in shape, and slightly flattened from before and behind. They are about the size of a large almond, with which they have been compared. Fig. 26 represents an ovary of about the natural size, with a number of cicatrices on its surface. The original of this was taken from a woman who died about three months after delivery, by Dr. Montgomery, who says it did not furnish the ovum that was fecundated—while the other ovary bore marks of having done so. The value of this drawing consists in its representing a perfectly natural ovary, uninfluenced by any physiological condition to which the organs are subject.

Before puberty, like the uterus, these organs are much smaller

FIG. 26.



than afterwards, and lie in a perfectly quiescent state, like two little white beans, in the iliac regions of the pelvis. At puberty they also take on their legitimate functions, and continue active until beyond the middle of life; and when their duty is done, the object of their existence accomplished, their functions terminate, and they begin gradually to return to their primitive size and condition.

There is something particularly interesting in the contemplation of this grand economy. During the early years of female life, while all the normal and other synergetic influences are required to develop and strengthen the vital organs, and enable them to perform and endure the great functions of life, the reproductive system remains in a perfectly passive state of bare existence, hardly made amenable to the law of ordinary growth. At an age when the organs essential to life, have attained to a certain degree of development and endurance, they cease to monopolize the entire stock of vital force, but graciously yield a portion, to be appropriated by the generative organs, to their own development; and in response to this new accession of vivifying power they are seen bounding forth, with miraculous activity, into comparatively new life, clothed with new attributes, and vested with new powers. Now, when the general system has acquired sufficient strength and powers of endurance, to perform and bear the duties of maternity, the generative system is enabled and prepared to commence the great work of reproduction.

The generative and general systems proceed, *pari passu*, hand in hand, for thirty years of the prime and vigor of life, the one supplying and the other discharging duties pertaining to the fulfilment of the Divine law of reproduction.

When the tide of life begins to ebb, and the hold upon it to weaken, and the general system to need all the nervous energy available, to sustain it against the encroachments of advancing age, and it can no longer endure the fatigues and cares of maternity, the generative system kindly yields again its borrowed forces, and retires to the peaceful seclusion of a simple, passive existence; and the general system, from this accession of new strength imparted to it, bears the weight of years with remarkable pertinacity, considering the amount of labor and exhausting duties it has

performed during the period of child-bearing. And after having performed her task faithfully, and filled her mission with fidelity, woman, the greatest blessing ever vouchsafed to man, resignedly and peacefully closes her eyes on all sublunary things, and joyously enters the bright portals of immortal life.

It is hoped the kind reader will pardon this little paraphrase, or rather digression, from the strict words of the text; though there is no apology to make for introducing it. It may, for the moment, lead the mind of the student away from the rigid investigation of the subject before him, but it may not be unprofitable, nevertheless, in awakening reflections in regard to its practical application.

The Structure of the Ovaries. These organs being enveloped in the broad ligaments, they form the external coat which is peritoneal. This covering is firmly attached to the organs by a thin layer of cellular tissue.

The stroma, or substance of the ovaries, is invested with a thick, firm, fibrous envelop known as the proper tunic, and sometimes called the *tunica abrogenia*, from its close alliance in function to the *tunica abrogenia testes* in the male. The proper tissue of the organs is regarded as glandular, and by some they are called the ovarian glands.

In function they are analogous to the male testes, in so far as they furnish the element of reproduction afforded by the female. They are also essential to menstruation.

Upon laying open one of these glands at puberty, it will be found to contain from fifteen to twenty small vesicles, which contain a fluid, coagulable by heat, alcohol and strong acids. Some of these vesicles are imbedded deeply in the substance of the gland, while others, which are more matured, are found nearer the surface, and others again, one or more at a time, are observed pressing up against the peritoneal coat, causing small pearly elevations upon the surface of the organ. By the aid of the microscope, large numbers of them, it is said, amounting to one or two hundred, very minute, may be seen thickly studded throughout the substance of the organs, many of which in due time enlarge, mature, and finally escape.

Besides the fluid contained in the vesicles, there is also a little

spheroidal body, which has been found to possess the essential qualities of the eggs of birds and other ovipara.

The vesicle above described was discovered by Fallopius, and subsequently investigated by R. De Graaf, whose name it bears, being known every where as the Graafian vesicle; it is also sometimes mentioned as the ovarian vesicle.

The little body found floating in the fluid of the Graafian vesicle was discovered by Charles Earnest Baer, and called the ovule of Baer. This ovule, or egg, at full maturity is about one-tenth of a line, or about one hundred and twentieth of an inch in diameter. One or more of these mature, and escape from the ovary, every twenty eight days, and the event is announced by the appearance of the catamenial flux.

If Figs. 26 and 27 be compared, a marked difference will be observed between them. The former represents the ovary in a quiescent state—the latter in a state of turgescence, is swollen and

FIG. 27.



THE OVULE ABOUT TO ESCAPE FROM THE OVARY IN A STATE OF MATURITY.

plump, from the presence of the enlarged and matured ovum, about to escape from the Graafian vesicle, 1. The pressure produced by its gradual enlargement causes the absorption of the proper tunic. An aperture is thus produced in it through which the vesicle protrudes. Like pressure produces an opening in the peritoneal covering and also in the coats of the

vesicle, and the ovum escapes, and is received in the fimbriated extremity of the Fallopian tube, and conveyed through the tube to the cavity of the uterus. This is the cause of the menstrual function; the manner in which it is produced will be further considered when that subject comes under discussion.

The Graafian Vesicle, Fig. 28, represents the Graafian vesicle, largely magnified, containing the ovule. When the ovule is at full maturity and about to escape, the vesicle containing it, while in the ovary, varies in size from the head of a pin to a large shot or small pea.

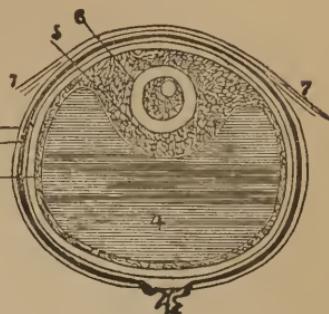
The Graafian vesicle has three coats or layers. Commencing externally, and proceeding inwardly, we have first the fibrous coat:

1. Composed of fibrous tissue; this coat is firmly attached to the structure of the ovary, and remains so attached after the escape of the ovum. The second is the vascular coat, 2. This is composed of a number of very small blood vessels, compactly arranged; it is scarcely entitled to the dignity of a separate coat or layer, but it is nevertheless so considered and classed. When the coats of the vesicle are perforated by the escaping ovum, these vessels discharge their contents in the cavity produced by the escape of the ovum, which becomes filled with a clot. The third and inner coat is mucous; this is softer and thicker than either of the others, and somewhat opaque; it is generally destroyed at the time of the escape of the ovum, or dragged out with it, or perhaps contributes to the formation of the corpus luteum. Inside of the mucous layer, lining the cavity of the vesicle is a layer of granules, called the granular layer. The cavity of the vesicle contains the fluid already mentioned, and an accumulation of granules, 5, the same as form the granular layer, called the *granular cumulus*, or *proligerous dish*; in this floats the ovum, 6. This figure represents the Graafian vesicle, previous to perforation of the peritoneum, and is invested with it at the upper part 7, 7, where is observed the elevation on the surface of the ovary, heretofore alluded to.

Recapitulation. In the substance of the ovary, is the Graafian vesicle, composed of three coats; within the cavity of this vesicle is found, the clear, limpid fluid, the *granular cumulus*, or *proligerous dish*, and the ovule or ovum.

The Ovum. The ovum at maturity, by the process already mentioned, leaves the Graafian vesicle. It is proposed now to study it in its independent relation. It being so very small—barely perceptible to the naked eye—it requires a strong magnifying glass to bring out the different parts of which it is composed.

FIG. 28.



THE OVULE IN THE GRAAFIAN VESICLE.

FIG. 29.

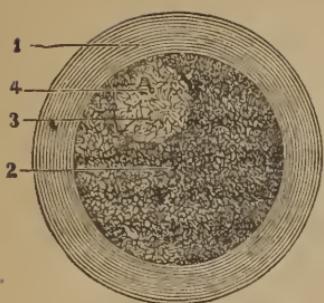
**OVULE OUT OF THE GRAAFIAN VESICLE.**

Fig. 29 represents the human ovum as it appears under the microscope, after it has left the Graafian vesicle at maturity. It consists of the vitelline membrane or transparent zone, vitellus, the germinal vesicle, or the vesicle of Purkinje, and the germinal spot.

The vitelline membrane, 1, appears under the microscope, as a large transparent ring, enveloping the vitellus

or yolk. The precise character of this membrane, is not clearly understood, but its consequence can be realized, when viewed as the analogue of the very delicate structure enclosing the substance of the yolk of the egg of fowls, and by means of which the definite shape and form of the yolk is maintained. This is the vitelline membrane of the egg, and when broken the substance is no longer maintained in form, but spreads out in a shapeless mass, running over the bottom of the vessel containing it. The vitelline membrane of the human ovum serves the same purpose. It is contended by some, that it is only a transparent layer of albumen surrounding the yolk; but that it is a resisting membranous structure is easily demonstrated by applying pressure to it, or touching it with an instrument. Bisechoff says: "There cannot be a doubt that the transparent zone is an elastic, thick, hyaline, and transparent membrane, without a determined texture." Dr. J. D. Linton, a former pupil of the writer, in examining an ovary, last winter (1865) observed the elevated peritoneum, presenting the appearance of a little vesicle, which he punctured with the point of his scalpel, when the ovule escaped; upon pressing which between the thumb and finger, it burst with a slight but perceptible pop, showing that the membrane possessed strength and a degree of resistance.

1. *The Vitellus, or Yolk,* 2. The cavity of the vitelline membrane is filled to a great extent by a granular fluid, which freely escapes when the membrane is ruptured. It possesses but very little adhesiveness, and separates readily from the interior surface of the envelop. It sometimes appears not to fill the cavity en-

tirely, being less than the cavity containing it. It is of a pale yellow color. It is the vitellus or yolk.

The Germinal Vesicle, 3. This is a slightly oval, very delicate, transparent, and colorless membrane, enclosing a limpid fluid, colorless and transparent also. Sometimes it is found in the middle of the vitellus, and sometimes on its periphery. Perkinje was first to describe it in the eggs of birds, and gave it his name ; but M. Coste first demonstrated it in the ovum of mammiferæ, which established its identity with the egg of birds. It has been seen intact, after having been separated from the ovum and the yolk, in which it is placed, showing it possesses a degree of consistency notwithstanding its extreme tenacity. It is about the sixtieth of a line in diameter.

The Germinal Spot, 4. This was first discovered by Wagner, who gave it its name. It consists of a number of small granules aggregated on some part of the periphery. Wagner has sometimes met with two, or even more, germinal spots in the mammiferæ.

Fig. 30 represents the ovary laid open longitudinally after the ovum has been discharged. The large cavity, 1, is shown, containing clots of blood. It also presents a more relaxed and flaccid appearance than before the escape of the ovum. This depends upon the disgorgement of the capillaries.

FIG. 30.



The clots become gradually absorbed, and the cavity fills up by degrees, until there is nothing remaining of it except an indentation or cicatrix on the surface. In women who have menstruated many times, and are well advanced in life, the cicatrices are very numerous ; so much so that the surface of the organ presents a very uneven and furrowed appearance, being studded with elevations and indentations. It is held by some, that the number of cicatrices indicates the number of times the woman has menstruated ; but there is a great deal of

APPEARANCE OF THE OVARY AFTER THE ESCAPE OF THE OVULE.

uncertainty in such an estimation, as it often occurs that two or more ova escape at one menstrual period. The cicatrices are represented by the irregular and promiscuous marks on Fig. 25, 26, and 29.

The Corpus Luteum. After the expulsion of the ovum, the cavity left in the ovary is, after a certain time, say eight or ten days, occupied by a *yellow body*, called the *corpus luteum*. In regard to the manner of the formation of this body, there are diverse opinions. Scarcely two authors can be found of similar views in reference to it, and each one gives an explanation of its development agreeably to his peculiar notions. A great diversity of opinion in regard to any *fact*, proves irrefragably that it is not understood, and any time devoted to the discussion of this subject, in the present state of our *knowledge* concerning it, would be uselessly wasted, especially as it would be of no known advantage, in either a practical or scientific point of view, even if it were understood. The student is therefore relieved from wading through pages of alleged experiments and microscopical observations, all arriving at different results, and referred to the article on "Human Conception" for a further consideration of the subject.

It has been said that the ovaries are analogous to the male testes, inasmuch as they produce what is afforded by the female, towards fecundation. The parallel of function does not end here, it is upon the presence of these organs that the peculiarities of the sexes depend; when they have been removed in either case, the characteristics of the sex begin to proximate towards those of the opposite one. The eunuch changes his voice; and he becomes more feminine in all his bearings and habits. The changes in the female, upon the loss of the ovaries, are equally marked; coarse, straggling hairs begin to grow upon the chin, the voice becomes hoarse and masculine, the peculiar delicacy of her sex is greatly modified, her moral attributes become changed, she loses all desire for sexual intercourse, and all the kindlier sensibilities that distinguish her sex vanish. In the celebrated case of Mr. Potts, where both ovaries were removed, in operating for strangulated hernia, these changes were especially verified.

In castrated males and spayed females of the lower animals,

similar changes are known to take place. Indeed, the object of their mutilation is to *destroy* the sexuality of their natures.

4. *Of the Fallopian Tubes.* These, named after Fallopius, their discoverer, are two in number, extending from the superior angles of the uterus along and within the superior margin of the anterior wing of the broad ligament, Fig. 24, 3, 3. They are about four and a half inches in length. They consist of three coats, the first is serous, furnished by doublings of the peritoneum, which form the broad ligaments, and between which the tubes are found; the second coat is muscular, the fibres of which are a continuation of the fibres of the uterus. They run in different directions, some longitudinally, some obliquely and others circularly; the third coat is mucous, and lines the cavity, it is a continuation of the lining membrane of the uterus. The outer extremities of the tubes are furnished with a number of fimbria, small finger-like processes, which form a sort of little hands, called formerly *morsus diaboli*, Devil's bit. There are two peculiarities connected with this extremity of the tubes that are found nowhere else in the body. The serous membrane, which forms the external covering, and the mucous membrane, that forms the lining, unite between the fimbria by a continuation of structure; it is the only instance where a serous and mucous membrane unite in this manner. The other peculiarity consists in a mucous cavity opening into a closed sack. In all other instances, the mucous cavities open externally. The shape of the tube is infundibular, the cavity at the fimbriated extremity being the largest, and it is gradually diminished in size until it enters the cavity of the uterus, at which point it is the smallest.

These organs are liable to adhesions. It often occurs that the fimbriated extremity is found adhering to the ovary, broad ligament, or to any of the surrounding structures. This extremity floats loose in the abdomen, and may become adherent to any part with which it may chance to come in contact. Sometimes the sides of the cavity become united together by adhesions throughout the whole length of tube; at other times only a small portion may be involved; in either case the function of the implicated organ is effectually destroyed. When both the tubes become closed in this manner, sterility is the result. The function of these organs is to receive the ovum as it escapes from the ovary, and conduct it to

the cavity of the uterus. The erectile quality of the organs is manifested at each menstrual nisus, when they become turgid and more or less erect. These organs possess a remarkable property, that has never yet been satisfactorily explained, and that is, the capacity of grasping the ovary just at the time and place of the escape of the ovum. Its erectile condition at this period may be referred to reflex action; but that instinct-like property that directs the little hand to the very spot where the rupture in the peritoneal covering of the ovary is about to occur, it matters not on what part of the ovary it may be, and at the precise time the ovum is about to escape, in which act it perhaps derives some assistance from the grasping, squeezing action of the fimbria, has hitherto baffled all attempts at explanation. May it not be referred to a law of electricity? May not the positive condition of the turgid and excited ovary attract the negative extremity of the tube to the spot most intensely electric, and retain it there by electric attraction until the ovum escapes, and enters the large extremity of the tube, which is found immediately over the aperture ready to receive it? When the ovum, which was the cause of the ovarian excitement, becomes removed the excitement subsides, the electrical condition becomes changed, and then, according to another law of electricity, that bodies similarly electrified repel each other, may not the tube loosen its grasp and retire from the ovary with the ovum in its cavity? whence it is propelled down through the tube by a sort of vermicular or peristaltic motion, into the uterine cavity. This peristaltic motion is imparted to it by the peculiar disposition of the muscular fibres of its middle coat.

These tubes are also traversed by the *semen masculinum*, as the spermatozoa have frequently been seen in the tubes and also upon the surface of the ovaries, at their fimbriated extremities.

Dr. Ramsbotham and others hold that the *fecundated* ovum only is transmitted through the tubes, but more recent investigations show that the ova, cast off at each menstrual nisus, are received and transmitted, irrespective of fecundation.

Some two centuries ago, there was a notion quite prevalent among physicians, that there were other means of transit, as a separate duct or ducts leading directly from the ovaries to the Uterus, through which the ova were transmitted to the cavity of

that organ. The ovarian ligament was at one time supposed to be a hollow tube, which served to convey the ova hence. But this hypothesis was exploded, upon the ligament being proved to be a solid cord.

The notion of there being a distinct apparatus for this conveyance, fell into abeyance, where it slept for a hundred years, when it was again revived by M. Cartner, of Copenhagen, who looks upon it as always present in the larger quadrupeds; but anatomists have searched in vain for it in the human subject, notwithstanding Dewees, and others of his day, favored the hypothesis.

5. *Of the Broad Ligaments*, Fig. 24, 4, 4. These are two in number, and consist of doublings of the peritoneum. They are processes thrown off from that portion lining the iliac muscle, and extend to each side of the uterus. In fact they extend across the pelvis, forming the external covering of the uterus, and come together at both latter margins, extending the whole length of the body and neck, spreading out like the wings of a bat, Fig. 24, 4, 4. They, with the uterus, form a partition across the pelvis, dividing it into two parts or regions; the anterior one is occupied by the bladder, and the posterior by the rectum. At the upper margin they are divided into two laminæ, called anterior and posterior wings. In the latter are found the ovaries and ovarian ligaments. In the former the Fallopian tubes and the round ligaments. The broad ligament of the left side is placed under a greater degree of tension, in cases of prolapsus uteri, which causes that sharp-lancinating pain in the iliac region. It is always augmented upon lifting, or rapidly ascending stairs, or taking a long walk, or using any undue exercise. This symptom of prolapsus is so constant as almost to render it the *pathognomonic* sign of the displacement. This circumstance arises from the fact of the position of the uterus being rather more to the right side of the pelvis, as has been mentioned heretofore.

The use of the broad ligaments is to support the uterus in its position. Dr. Ashwell, and some others, however, aver to the contrary.

6. *Of the Round Ligaments* (also, sometimes called the *suprapubic cords*, Fig. 24, 5, 5). They are two in number, and come off from the lateral angles of the uterus, just in front of and a little

below the Fallopian tubes. They are composed of a continuation of the fibres of the uterus, pass along between the two layers of the peritoneum, that constitute the broad ligaments, traverse a portion of the brim of the pelvis, and enter the external abdominal ring. They pass through the abdominal canal and attach themselves by a number of filaments, into which their outer extremities are divided, to the structures about the external labia and groin. Ramsbotham says: "They consist of a congeries of blood-vessels, nerves and absorbents." Velpeau says: "Formed of reddish and wavy fibres, which rise from the anterior and middle transverse layers of the womb, the round ligaments are evidently of a muscular nature." Dewees says: "These ligaments are very vascular; especially during pregnancy." Here we have three different opinions in relation to the structure of these organs by as many authors of equal distinction. Recently Mr. Deville has *demonstrated* them to be a continuation of the fibres of the uterus. The vascularity, &c., attributed to them are only sufficient for their proper organization. Madame Boivin was first to mention the fact of the right ligament being shorter and stouter than the left.

Their use is to assist in maintaining the uterus in its position in the pelvis. In instances of prolapsus there is often complaint made of a painful dragging sensation in the groins. This is occasioned by undue tension to which the ligaments are subjected during the displacement. A similar sense of uneasiness is also experienced after taking a long walk, and proceeds from the same cause. From the position of these ligaments they cannot but act as stays or checks to prevent the uterus from falling backwards and assuming the malposition, known as retroversion.

SECTION II.—OF THE NERVES OF THE GENITAL SYSTEM.

When we take into consideration the vast, almost unbounded, sympathies existing between the genital system and the distant organs of the body, both physiologically and pathologically, we are, as it were, instinctively led to inquire into the cause of the phenomena we see manifesting themselves; and to understand which, is impossible, without an intimate acquaintance with the

nerves supplying the parts, and their relation to and connections with the organs sympathetically involved.

The head is frequently affected, during pregnancy, with more or less pain and giddiness; and diseases of the uterus are often attended with vertigo and dimness of vision. The sympathetic relation between the uterus and brain is maintained through the medium of the *spinal cord* and *sympathetic nerve*. It is connected with the former by means of the sacral nerves that enter into the hypogastric ganglion, and with the latter through the hypogastric ganglion and the spermatic and hypogastric and other plexuses. Through these media there is a direct communication maintained between the uterus and brain, by which the sympathetic relation is kept up.

The heart and lungs are not unfrequently disturbed sympathetically during unquiet conditions of the uterus, and palpitation and dyspnœa are the result. These organs are connected with the sympathetic nerve by means of the *cardiac plexus*.

The mammary glands are developed at puberty, and are often perceptibly affected with pain, soreness and swelling at each menstrual nisus, and a change in them is one of the early symptoms of pregnancy. These changes are purely sympathetic, and are effected through the medium of the spinal cord alone, by four *subcostal branches of the thoracic spinal nerves*.

The stomach is almost universally affected with nausea and vomiting during early pregnancy, and later with cardialgia, pyrosis, &c. And most derangements and diseases of the uterus are attended with dyspeptic symptoms and other gastric disturbances, which are entirely sympathetic, induced through the medium of the sympathetic nerve, with which it is connected through the *thoracic ganglion*, the *great splanchnic nerve* and the *coronary and hepatic plexuses*.

The liver is also sympathetically affected by uterine disturbances, through the sympathetic nerve, by means of the *hepatic plexus*.

The bowels not unfrequently sympathize with the uterus in its pathological conditions, resulting in either constipation or diarrhoea. The *superior mesenteric plexus* connects them with the sympathetic nerve.

The kidneys likewise are sympathetically affected through

uterine disturbances, by means of the *renal plexus* of the sympathetic nerve.

The back is the seat of a most constant sympathethic pain and uneasiness during uterine disturbances, and at the time of labor these sufferings are often excruciating. The communication between the uterus and affected part is partly due to the *lumbar ganglion of the sympathetic nerve*, which sends branches to the *quadratus lumborum muscle*, and partly to the *lumbar and sacral spinal nerves*, which supply the *sacro-lumbalis* and *longissimus dorsi* muscles.

If it would not be trespassing too much upon the department of physiology, it would not be amiss here to remark that the sympathetic and spinal nervous systems are both endowed with sensitive and motive properties. The sympathetic system presides over all the automatic movements, or those effected without the action of the will, as of the heart, stomach, intestines, uterus, Fallopian tubes, &c., while the cerebro-spinal system is under control of the brain, and acting in accordance with the will, excites voluntary motion, the powerful action of the uterus, in expelling the foetus, therefore, is due entirely to the motor properties of the sympathetic nerve, and the exhibitions of voluntary muscular strength and motion are due to the cerebro-spinal nerves; and the pain experienced in any of the organs supplied by the sympathetic, in a state of disease, is through the sensitive properties of that nerve, while the pain or inconvenience experienced in any part of the voluntary motor apparatus, arising from disease or injury, is through the sensitive properties of the cerebro-spinal nerves. Hence the sympathetic disturbances in any of the distant organs, arising from uterine difficulties, may be induced through either the sympathetic or cerebro-spinal nervous system, according to whichever presides over the affected organ or part.

There are several other spinal nerves that derive their importance, obstetrically, from their position within and about the pelvis, and from the suffering induced by mechanical pressure upon them by the gravid uterus, during the latter weeks of gestation and by the head of the foetus during parturition. These are:

1. *The Cutaneus Externus*, or external cutaneous nerve, which arises from the lumbar plexus. It passes across the *iliacus internus* muscle towards the anterior superior spinous process of the ileum,

and emerges from the abdomen by penetrating the commencement of Poupart's ligament. It is distributed in several branches to the integuments of the vastus externus muscle and along the edge of the rectus femoris; one of the branches extends to the knee. This nerve is too high to be affected during labor, but is subject to pressure towards the termination of gestation, producing numbness on the outer part of the thigh.

2. *The Cruralis Anterior*, or anterior crural nerve, arises from the middle nerve of the lumbar plexus. It gets from under the psoas magnus muscle and passes from the abdomen under Poupart's ligament outside of the femoral artery, and supplies the abductor muscles, the four extensors, the pectineus, the sartorius and gracilis muscles. It also, from its position, is free from pressure during labor, but is liable to it towards the close of pregnancy, causing cramps on the inner and forepart of the thigh.

3. *The Nervus Obturatorius*, or obturator nerve, is also derived from the middle of the lumbar plexus. It descends into the pelvis from beneath the psoas magnus, near the sacro-iliac junction, and passes forwards and downwards to the obturator foramen; after passing through which it divides into two branches, the anterior and posterior. The first is distributed to the abductor longus and brevis, and to the gracilis and integuments. The second terminates in the obturator externus and the abductor magnus. Its position renders it liable to pressure in the early part of labor, while the child's head is entering the superior strait, which produces cramps on the inside of the thigh.

4. *The Nervus Ischiadicus*, or great sciatic nerve, is the common trunk formed from the sciatic plexus. It is by far the largest nerve in the body. It lies over the sacro-iliac symphysis, and passes out of the pelvis, through the great sacro-sciatic foramen, by the side of the pyriform muscle. It crosses, vertically, the small rotator muscles of the thigh, being concealed by the inferior edge of the glutæus magnus, it descends on the back of the abductor magnus, at the outer edge of the long head of the biceps flexor cruris, about half way between the tuberosity of the ischium and the trochanter major. About half way down the thigh the sciatic nerve divides into the popliteal or posterior tibial and peroneal. Before the division, the nerve runs back of, and parallel to, the femoris, from the trochanter; afterwards the branches diverge; the

popliteal branch continues straight downwards to the middle of the back of the knee-joint. This branch distributes others to the muscles of the thigh, and to the integuments of the calf of the leg. The peroneal branch supplies the knee-joint, the leg and continues to the sole of the foot. This nerve, situated in the back part of the pelvis and passing directly through it, can hardly avoid pressure while the head is passing through the cavity and outlet.

Cramps of greater or less violence are experienced in the extensor muscles of the thigh, the calf of the leg, and often the sole of the foot, this is almost universally the case in lingering labors. These cramps frequently augment the sufferings of the patient to a high degree, giving occasion to greater complaints than even the labor pains.

The suffering can be sometimes temporarily mitigated by grasping the affected part with both hands and making firm pressure upon it. Occasionally more permanent injury is sustained from pressure upon this nerve during labor, especially if it be protracted and tedious; lameness and partial paralysis have resulted, and continued for several weeks after their occurrence.

Sensation, motor action and respiration are all concerned in *parturition*. It has already been stated that the sympathetic nerve is both sensor and motor, and that the expulsive action of the uterus is induced and continued through the medium of that nerve, and that it is also involved in the sensational phenomena of the process. Allusion has also been made to the part the cerebro-spinal nerves play in the operation. The respiratory apparatus is as deeply implicated in the parturient effort, almost, as either the sensitive or motor means of accomplishing the end. The respiratory organs are primarily brought into action, through the agency of the spinal cord. This cord is constituted of six columns, two of three columns each, placed side by side with a longitudinal fissure between them. The anterior and posterior column give off nerves to each side of the body; they extend up into the substance of the brain. The anterior gives rise to the motor, and the posterior to the sensitive elements of the nerves; the middle one is called the respiratory column, and terminates in the *medulla oblongata*. This, the long brain, presides over respiration and nutrition. When the head of the child in its

descent protrudes through the os uteri and presses upon the upper part of the vagina, which is supplied, by the sympathetic nerve, which is in relation with the medulla oblongata, through the spinal cord, it becomes excited, the irritation is transferred to the lungs and diaphragm; these acting simultaneously with the respiratory muscles of the chest and abdomen, the whole of the respiratory apparatus is thrown into extraordinary action, and all the respiratory phenomena are manifested that are witnessed in an ordinary labor. It has been proved by experiments on animals, that when the spinal cord has been divided in the middle during parturition, no unusual respiratory action takes place. This subject will be further pursued when that of labor comes under discussion.

Dr. Tyler Smith observes: that "the nerves of the uterine system can be best studied as a distinct group, and for this purpose they form a class almost as well marked as the respiratory nerves. This group will include the nerves of the ovaries, Fallopian tubes, uterus, vagina, and the external parts of generation." To his admirable work on parturition, the student is referred for a detailed description of this group, and the functions of the various nerves composing it.*

CHAPTER III.

OF THE MAMMÆ.

THE *Mammæ*, or breasts. These organs, whose function is the secretion of milk for the new-born infant, are appropriated as personal ornaments, by young, unmarried females; and prized by them as of great value in that regard; and where they are defective in size, or considered so, the deficiency is supplied at the present time with artificial appliances, as cotton pads or wire hemispheres, which are worn beneath the clothing, to give prominence

* Horner, Müller, Ramsbotham, Tyler Smith.

and symmetry to the bust. The cotton breast-works, are as detrimental to the mammae, as they were to the British at New Orleans. The pressure they inflict upon the glands, causes absorption and a still greater diminution of their bulk; it also diminishes the milk ducts, and unfits the organs for subsequent use. The wire arrangements are less injurious, as they are designed to be placed over the mammae, and afford the desired prominence, without producing pressure. It is not the young and inconsiderate alone, that are guilty of this inexcusable folly, but maturer dames and grandmothers are found to be participants in it.

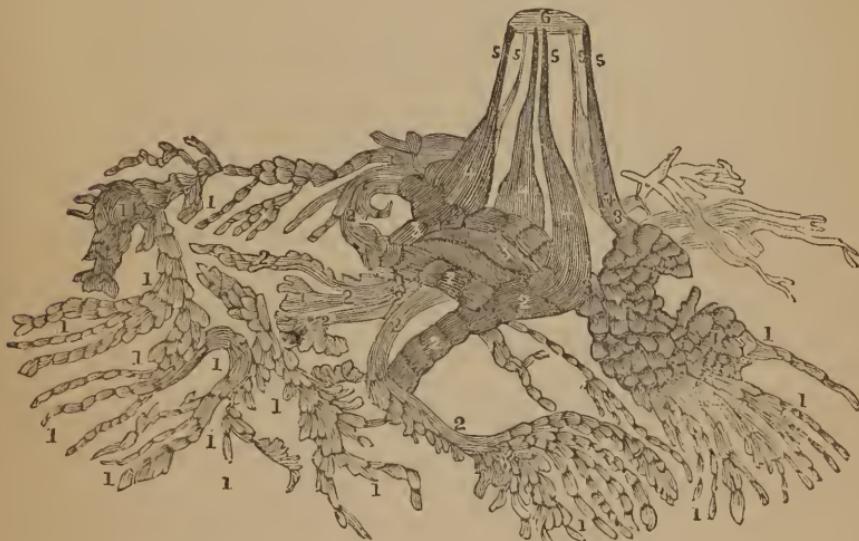
The breasts are two in number; they are situated in front of the chest, upon the same line, over the pectoralis major muscle, and between the axillæ and the sternum. They are conical in shape, with a broad circular base, and the apex terminating in the nipple. The base is attached to the muscle by means of a layer of loose cellular tissues, which admits of easy mobility of the organ, and when left free, their own gravity causes them to swag down, until, sometimes, they become entirely displaced from their original seat; and from time immemorial stays and corsets have been worn to assist them in maintaining their natural position. The breasts consist of the true skin, which is very fine and soft; a layer of cellular tissue, which is of greater or less abundance, and supplied with adipose matter in proportion to the quantity of cellular substance, and the glandular structure which forms the basis of the organ. There is a tolerable degree of uniformity in the size of the glands in different women, especially when young and unmarried. They are not of the same size at all periods of life. After the menstrual and child-bearing period, they gradually decrease in bulk, until, in advanced age, they are not much larger than they were before puberty.

At that epoch the glands begin to develop, and in a very short time attain their full size. They are generally influenced by menstruation, becoming more plump and solid, and often tender to the touch, upon the approach of each period; after the nisus has passed this tenderness subsides, the unusual fulness disappears, and they resume their accustomed dimensions and consistency. They are also affected by the sexual orgasm, and after an indulgence they become more soft and flabby, but return to their wonted

condition in three or four days. Often during the first weeks of gestation, and always during the latter months, they increase in size, and sometimes become sensitive and painful; they are also enlarged during lactation. These changes all take place in the glands, and their swelling renders more tense the skin and cellular tissue that envelop them.

In young, chaste, unmarried females there is not so much difference in the size of the glands as one would suppose, judging from their external appearances. Like the mons veneris and labia externa, their superior prominence is derived from the amount of cellular tissue surrounding them and the fatty matter contained in it. Those who are fat, or more inclined to flesh, have larger breasts than those of the opposite condition. Fat women who have nursed

FIG. 31.



PREPARATION WITH SIX MILK TUBES. INJECTED FROM THE NIPPLE BY SIR ASTLEY COOPER.

several children, and become far advanced in life, have quite large breasts, while those who are thin, under like circumstances, have only a quantity of loose flabby skin, and a shriveled nipple to mark the place where once were those munificent and graceful organs. In both cases the glands, after having ceased to be excited by menstruation, gestation or lactation, and their end having been accomplished, alike become absorbed and finally, almost if not entirely, disappear.

The gland is of a delicate light pink color; and though very flaccid and yielding on being handled, yet its texture is actually extremely tough, and is cut only with considerable force. With the exception of bone, it dulls a knife sooner than any other tissue of the body. Its grosser arrangements consist in lobes of different sizes, united in such a way by cellular texture, that, though they can be pulled somewhat apart, they cannot be entirely separated without injury, 1, 1, 1, 1, 1, &c. (Fig. 31). These lobes, when examined through skin, give to the gland a knotted feel, and are sometimes partially affected by inflammation, so as to become still more distinct. The lobes are composed of lubuli, which are resolvable by maceration and particular modes of treatment, into small graniform masses (*acini*) about the size of a millet-seed, and which contain the ultimate glandular arrangement. The acini themselves consist of very small oblong vesicles, united by cellular substance, and by the common blood vessels; and are said to be very apparent by the aid of a microscope in a lactescent gland.*

The excretory ducts (*Ductus Galactophori Lactiferi*) of this gland are numerous, 2, 2, 2, 2, 2, &c. They are of an arborescent shape, and begin by very fine extremities or ramuscles in the acini; the ramuscles from the acini coalesce into a larger branch, several branches unite to form one still larger, and so on successively, until a lactiferous duct, constituting as it were the body of the tree, is formed by this assemblage. These trunks vary considerably in size according to the number of tributary branches, and having got towards the centre of the gland near the nipple, from two to four of them according to Cuboli, run into a common stock or root called a lactiferous sinus, 3, 3, 3, 3, &c. These sinuses are in all about fifteen, they are only a few lines long, and differ in size, some not being larger than a lactiferous tube, while others have a diameter of from two to three lines. The sinuses at the end next to the nipple, terminate in a sort of rounded cul-de sac, 4, 4, 4, 4, but from the extremity of the sac a very fine conoidal tube arises, which runs through the nipple, and conducts the milk to the surface, 5, 5, 5, 5. This tube from its shape is suited to the retention of milk; in addition to which it is sometimes dilated in the middle, is

* Majorlin, Manual de Anat.—J. K. Meckel, Manual de Anat.

curved when the nipple is not in a state of erection or stretched out, and terminates by an external orifice, which is so fine as to be seen with difficulty to the naked eye.

The excretory ducts of the gland, under which term may be comprehended the lactiferous tubes, the sinuses, and the conoidal tubes of the nipple, are formed by a soft, thin and transparent membrane, very capable of extension and contraction. The trunks generally go deeply through the substance of the glands and are tortuous, but do not anastomose laterly with one another; whence it happens that the lobes and lobules of the glands are arranged into sections, each of which has its appropriated excretory ducts. In order then to make a complete injection of the gland, each sinus must be separately injected through its papillary conduit. This rule is not, however, of universal application, as in some experiments performed by the elder Meckel upon women advanced in pregnancy and during lactation, he succeeded in forcing mercury from one sinus, by its ramification, into those of another: this route was supposed to have been through the finest extremities of the ducts. The whole gland itself may, however, from the unfrequency of this circumstance, and from the difficulties and partial condition of these anastomoses, rather be considered as a congeries of smaller glands, kept distinct by the interposition of cellular substance between their lobes; but joined, in one respect, by having the termination of their excretory tubes collected into one bunch in the nipple. This latter circumstance seems to be only a provision for the more convenient sucking of the infant.

The excretory ducts are no where furnished with valves, which accounts for the facility with which they may be injected backwards from the nipple. An opinion was entertained by Haller, and by other Anatomists after him, that some of these ducts originated in the surrounding cellular substance; but this has been refuted by the researches of Cuboli. Some Anatomists have thought that there is a direct communication between the ends of the lactiferous tubes and the arteries, veins and lymphatics. Mascagni, after a very successful injection of the gland, whereby its vessels were filled with quicksilver, not meeting with such an occurrence, was induced to think that when the communication did happen, it was produced by rupture.

The Areola, is a rose-colored circle in virgins which surrounds the base of the nipple. In women who have borne children, or in those whose age is advanced, it becomes of a dark brown.

The skin of the areola is extremely delicate, and on its surface, particularly in pregnant or nursing females, there are from four to ten tubercles, which sometimes form a regular circle near its circumference, and in other subjects are irregularly distributed. The darkening of the areola, and the enlargement of the tubercles form one of the early signs of pregnancy. Each of these tubercles has near its summit three or four foramina, which are the orifices of the excretory ducts of little glands forming the tubercle. The areola consists of a spongy tissue, beneath which there is no fat; it is susceptible of distension during lactation, or from particular excitement.

The greater number of Anatomists have considered these tubercles as intended only for the secretion of an unctuous fluid which lubricates the areola and nipple, and protects them from excoriation from the sucking of the infant. It is said, however,* that when some time has elapsed after a repast, or when there has been a long interval to the nursing of the child, that milk flows from them abundantly; but that in inverse circumstances a transparent, limpid fluid is distilled in small drops; all of which would tend to prove that they are of the same nature with the mammæ themselves, being only smaller. In addition to them, it is said, that the areola and the nipple are furnished with a great number of sebaceous glands, which do not elevate themselves above the surface, and which may be found on and near the tubercles.

The Nipple, 6, is a truncated cone situated a little outwardly from the centre of the mammæ, of the same color with the areola, and surrounded by it. The lactiferous ducts terminate on its extremity. It is collapsed and in a very pliable state for the most part, but when excited it swells, becomes more prominent and of a deeper color, showing its connection with the erectile tissue. Its skin is rough and provided with numerous and very small papillæ. Its internal structure consists of the extremities of the lactiferous ducts united by condensed cellular membranes.

*J. F. Meckel.

The mammae are supplied with blood from the external thoracic intercostal, and internal mammary arteries. Its veins attend their respective arteries. The nerves come from the axillary plexus and from the intercostals. The lymphatics run into the internal mammary-intercostal and axillary trunks.*

All mammiferous animals are provided with similar organs, for the exercise of corresponding functions, but there is a vast difference in the manner of their arrangement. In the human female, we see two udders, each of which is furnished with a nipple, for the purpose of being sucked. In a large class of quadrupeds there is a much greater number. In many instances there are from four to six pairs, arranged in two rows, longitudinally under the belly, one row on each side of the median line, extending from just behind the fore legs to near the hind ones; each udder is supplied with a nipple or teat. In other quadrupeds there is but one udder, which is placed beneath the back part of the belly, between the hind legs, and furnished some with two teats, and others with four, &c.

In the human male there are small mammary glands called *Mamilæ*. In some instances there is a full evolution of the glandular structure, and some fleshy men have breasts larger than many women.

* Horner.

PART THIRD.

CHAPTER I.

THE SYMPATHETIC ACTIONS AND REACTIONS BETWEEN THE THREE GREAT REPRODUCTIVE ORGANS, NAMELY, THE UTERUS, OVARIES AND MAMMÆ.

THE various sympathies existing between the three great reproductive organs, *the Uterus, Ovaries and Mammæ*, are different and distinct from that universal sympathy, that is manifested in the general development of the young girl at the commencement of her menstrual life, of which the ovaries are the source; and which are put into action by their development at puberty. This is universal; passing over her like a thing of magic; beautifying her person and maturing her mind, effecting in a few weeks, what it would require years of ordinary growth and training to accomplish. The effects of this sudden sympathetic influence, this metamorphosis, are lasting, continuing in full vigor and plenitude during all her menstrual life, and only waning with the declining vital powers, never to be rejuvenated during her earthly existence.

The reciprocal sympathetic relations existing between these organs, to which we wish to call attention, are changeable in their manifestations, first exciting one and then another, and then the third, alternating, and moving in accordance to fixed physiological laws. This alternation furnishes a key by which we are enabled to unlock and explore the mysterious phenomenon of catamenial periodicity.

These ever-changing reciprocal actions, very interesting and highly instructive, are instituted and maintained by means of neural forces, supplied by the motor and sensor nerves, which connect the organs together physiologically, and by synergetic influences drawn from the general sympathetic and cerebro-spinal nervous systems.

Dr. Tyler Smith has given a protracted analysis of these reciprocal actions, and presented the subject, with a great clearness of comprehension and perspicuity of language. Without aiming to follow him in his details, it is designed in this article to give a synopsis only of the principal points he has so ably and scientifically elaborated.

SECTION I.—OVARIAN ACTIONS.

1. *Actions of the Ovaria upon the Mammæ.* It has already been stated that the ovarian irritation at the catamenial period excites tumidity and pain in the breasts, and that an altered state of the mammæ is one of the first indications that the ovaries are excited. In dysmenorrhœa, or painful menstruation, the painful state of the ovaries is frequently accompanied by mammary pains. At puberty, the development of the ovaries causes a development of the mammæ. In those cases where menstruation occurs during lactation, or nursing, women have observed an increased flow of milk at each menstrual period.

During these exhibitions of a sympathetic relationship existing between the ovaries and breasts, the neural forces are sent from the ovaries to the mammæ, which, being expanded within these organs, causes the irritation just mentioned.

2. *Actions of the Ovaria upon the Uterus.* The irritation of the ovaria, induced by the presence of the enlarging and maturing ovum, causes a sympathetic irritation of the uterus, which results in the diminution of the catamenial flow. Previous to puberty, it will be remembered that the uterus lies in a quiescent and undeveloped state, but as soon as the ovarian development is instituted, the uterus becomes endowed with new life, enlarges and prepares for its important functions. In congenital absence of the ovaries, and where the uterus is well formed, there are presented no signs

of menstruation, in either the mammae or uterus—showing the ovaries are the excitors of the catamenial irritations.

In this case the neural force is directed from the ovaria to the uterus, which calls forth its latent energies, and animates it with new life.

SECTION II.—UTERINE ACTIONS.

1. *Actions of the Uterus on the Ovaria.* Irritation of the uterus and utero-vaginal passage produces inflammation of the ovaries; this is frequently seen in abandoned women, in whom the Fallopian tubes are often adherent to the ovaria from inflammatory action. During *pregnancy*, the actions going on in the uterus modify the ovarian function, in so far as to mask, or partly suspend, the periodic excitement; hence the interference with menstruation.

Here the *uterus* becomes the source of sympathetic irritation, and the neural force sent out from *it* is expended upon the ovaria, modifying their actions.

2. *Action of the Uterus upon the Mammae.* It is to the state of the uterus at parturition that the secretion of milk is due. At every catamenial period, the state of the uterus reacts on the mammae, increasing the mammary pain and tumidity. In irritation of the utero-vaginal passage in leucorrhœa, or in cases of uterine tumors, milk is frequently secreted in the breasts. In cancer, the pathological synergies between the uterus and the breasts are often strongly marked. The synergic actions between the uterus and the breasts produce, it is well known, one class of the signs of pregnancy. The enlargement of the mammae, the development of the nipples, and the formation of the areolæ, are examples of this.

SECTION III.—MAMMARY ACTIONS.

1. *Actions of the Mammae upon the Uterus.* Irritation of the breasts excite the uterus in a decided manner, and the application of an anodyne liniment to the breasts will sometimes allay severe uterine pain. The action of a blister, or sinapism, applied for the purpose of exciting the catamenial flow, have been known to produce irritation and inflammation of the uterus. The irritation of the uterus, by the sucking of the child, as the induction of after-

pains, and the secretion of milk after delivery, is familiar to every practitioner. The production of abortion by irritation of the mammary nerves is a still stronger fact of the same kind. In disease the synergetic action from the breasts to the uterus is quite as definite, as that which exists in the converse direction.

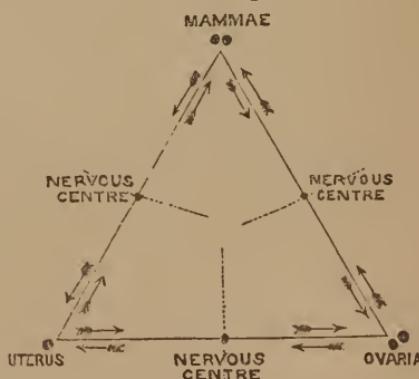
2. *Actions of the Mammæ upon the Ovaria.* The influence of the mammae upon the ovaria is very distinctly seen, in the arrest of the ovarian periodicity by lactation. As long as sucking is continued, the state of the breasts prevents the processes of ovulation and the catamenial flow. Those cases where lactation and ovulation proceed together, are exceptions, as much so as the occurrence of pregnancy and the catamenial flow.

Some of the foregoing facts are pathological, and others are physiological. The former proves the physiological relations between the organs as conclusively as though they were all physiological, because it is impossible for there to exist any pathological relations where there are no physiological connections. As simple facts, many and probably all of them have been recognized and considered before, but Dr. Smith was the first to arrange them in their proper order, consecutively, and assign to them their due significance in the process of reproduction.

Practically considered, the foregoing arrangement of facts is valuable in directing attention to distant organs for the cause of existing pathological phenomena.

Viewed scientifically, as the means of explaining the menstrual periodicities, its value is greatly enhanced. In the annexed diagram the three great organs of reproduction are represented at the angles of the physiological triangle that they are presumed to form. The points where the dotted lines intersect the three sides represent the nervous centres, or the points in the spinal cord that receive and transmit the neural force or influence as it passes from one organ to another, and the arrows represent

FIG. 31½.



the course taken in its transit. For instance, in the actions of the mammae upon the ovaria, the nerve power, or neural force, is represented, by the inside arrows, as passing from the mammae through the nerves that supply them to the nervous centre, or spinal cord, and from thence to the ovaria, through the nerves supplying them, which become similarly affected with the mammae. The same is the case with respect to the other organs. In the same manner are all the reflexed actions of the body effected; it is not by the direct transmission of nervous influence from one organ to another, but through the medium of the nervous centres, either the brain or spinal marrow, or both.

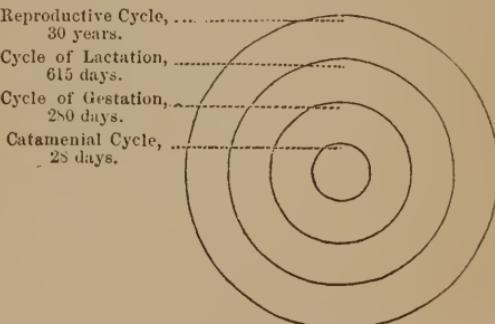
The student is now prepared to proceed with the inquiry, how does this explain the catamenial periodicities? The answer to the question will develop itself as he advances in the investigation. He will commence his inquiry at the termination of a menstrual period; at that time the ovaria have discharged their matured ova, and are ready to prepare for the next period. Now the nervous force is directed *from* the mammae and uterus *to* the ovaria, and this is persistently maintained for, say, twenty-four days, during which time the ova or ovum, as the case may be, is maturing. Thus are the ovaria receiving aid from the mammae and uterus, in consummating the process of maturation; the ovaria as they approach the height of their excitement, react upon the mammae and uterus, and tumidity and sensitiveness of these organs are the result. Immediately after the expulsion of the matured ova, the ovarian excitement subsides. Now the neural currents are set up from the mammae and ovaria towards the *uterus*, which continues, say four days, and it, in like manner with the ovaria, receives aid from the mammae and ovaria, in consummating the process of menstruation. When this function is not interfered with by pregnancy or disease, these organs continue repeating the same physiological process for thirty years. Now it will be observed that during the twenty-four days, which period is denominated the interval between the periods, the mammae and uterus are supplying the ovaria with nervous force precisely as the mammae and ovaria supply the uterus during the four days. The twenty-four days are therefore as much a menstrual period as the four days are. The twenty-eight days, which constitute a regular menstrual month,

counting from the first day of one ovulation to the first day of the next, might be divided into two periods, the former the long, and the later the short period. Thus is answered the question, *how* the foregoing arrangement of facts explains the catamenial periodicities. That is, during the long period of twenty-four days the uterus and mammae aid in preserving the ovaria in a condition favorable to the maturation of the ova, and during the short period, or four days, the mammae and ovaria aid in preserving in the uterus, conditions favorable to the elimination of the discharge. After the menstrual function has been interfered with by conception, the neural forces from the mammae and ovaria are directed towards the uterus, upon which organ they continue to be discharged for ten menstrual periods, or 280 days, during which time the uterus is preserved in a condition favorable to gestation. At the termination of this period, the uterus expels its contents and returns to nearly its original condition : then the neural influences of the uterus and ovaria are directed towards the mammae, where they continue to be discharged during lactation; during which time they aid the mammae in preserving conditions favorable to lactation.

The annexed diagram is designed to represent the physiological cycles of reproduction.

The first and smallest one is the catamenial cycle of twenty-eight days duration. When this is departed from by impregnation, we have one set up, consisting of ten catamenial cycles; the cycle of gestation, of two hundred and eighty days. At parturition there is started another one, say of one year, or three hundred and sixty-five days, which, added to the cycle of gestation, makes a still greater divergence from the catamenial cycle, of six hundred and fifteen days. After this terminates at weaning, the reproductive system returns again to the catamenial cycle, which is renewed, and continues its evolutions until again arrested by conception, when again the rounds of men-

FIG. 32.



struation, gestation and lactation are included in the great cycle of reproduction, which continues from the commencement to the termination of menstruation, a period of about thirty years.

The function of lactation is so entirely under the control of fancy, necessity or convenience, that there is but little uniformity in its duration. Sometimes it is allowed to continue until the child is twenty months old, or more; at other times it is cut short at one month; and sometimes it is not permitted to commence at all.

At no time does gestation or lactation entirely suspend ovarian action. At what would be every period of ovulation, there is an ovarian excitement, but so modified and controlled by gestation and lactation that is not always perceptible: at other times it is marked by either regular or irregular sanguineous discharges from the vagina during gestation, and by tumidity and an increased flow of milk, and not unfrequently by a vaginal flow at those periods during a great part of lactation.

CHAPTER II.

MENSTRUATION.

MENSTRUATION (*Menstruatio*, from *menses*, months), is the term applied to a function peculiar to the human female, which consists of a sanguineous discharge from the vulva occurring every month; hence the name *menses* has been applied, to designate this particular discharge. *Catamenia* (from *zata*, kata, according to, and *μην*, men, the month), is a term also employed for the same purpose. It is known in common language among women as "*the courses*."

Puberty (from *pubertas*), is the age at which young persons of either sex become capable of procreating their species. The legal age of puberty is fourteen years for the male, and twelve for the female. In the latter this interesting epoch is announced by the appearance of the *catamenia* or *menses*. The aberrations in regard to the time of the commencement of menstruation are very great,

and are favored by a variety of circumstances, as climate, state of health, habits, mode of education, manner of living, &c., &c. Between the tropics, where all nature is precocious, and where vegetable, as well as animal life, is pushed forward upon the high-pressure system, it is not uncommon for children of seven or eight years of age to be found nubile, and at eleven or twelve carrying their babies in their arms; while the women of the frigid zone seldom menstruate before they are eighteen or twenty, or even twenty-two. Every degree of difference between these extremes of climate, has its effect on the females of different climes, in influencing their catamenial epochs. In this latitude, puberty occurs, as a general thing, between thirteen and fifteen years of age. Instances, however, are not uncommon, of girls menstruating at twelve, or even ten years old. A few isolated cases are mentioned by authors, of a sanguineous discharge taking place from the vagina in infants of but a few months old, and recurring regularly every month; but these cases are to be regarded rather as anomalies, arising from some morbid condition of the lining membrane of the genital organs, than instances of normal menstruation.

A very remarkable and interesting case of precocity is given in "The Boston Medical and Surgical Journal, of February 19th, 1863." Dr. Josiah Curtis, of Boston, in his annual report to the Legislature, of the marriages, births and deaths in the State, for the year 1858, alludes to this very remarkable case: Elizabeth Drayton was born May 24th, 1847. This we have upon the evidence of Dr. Alfred Baylies, who attended her mother at the time of her birth, and others. Dr. Baylies also attended Elizabeth on the 1st day of February, 1858, when a male child was born—"a nice, full-grown, plump baby, weighing eight pounds, good weight." These dates make Elizabeth just ten years, eight months and seven days old, when she became the mother of this fine, full-grown child.

The reputed father was a boy between sixteen and seventeen, who was detected in the illicit intercourse with Elizabeth, on the 1st day of May, 1857, by his aunt, at whose house they were staying. He was immediately sent home to his father in Maine, after being detected. These dates show that Elizabeth became pregnant twenty-three days before she was ten years old. The child was

born February 1st, 1858, leaving just nine months between their detection in the act and the birth of their child. Dr. Baylies says: "The mother menstruated once or twice before conception, and was of good size for her age."

"Dr Curtis has examined a number of works, and has found no record of a case that was parallel to the one above related. The following references were sent by him:"

Dr. Tanner says (*Signs and Diseases of Pregnancy*, p. 9, London, 1867):—"The earliest age at which pregnancy is positively known to have occurred in this country is eleven years. While in labor, the girl was seized with convulsions, but was delivered of a full-grown, still-born child, without unusual difficulty, and she recovered favorably." Delivery occurred when "she was only a few months advanced in her twelfth year. Her figure was that of a full-grown woman. Mammæ were fully developed, and it was proved that she had menstruated before she had become pregnant."

Dr. Montgomery says (*Cyclop. of Practical Medicine*, Article, *Signs of Pregnancy*): "Conception before the age of fourteen is very rare, but it appears that instances of it have occurred. Bruce mentions that in Abyssinia he has frequently seen mothers of eleven years of age, and Dunlop witnessed the same in Bengal. La Motte delivered a girl who had not completed her thirteenth year. Instances of conception at nine and ten years of age are recorded by Jubert and others, but they scarcely appear deserving of credit; yet we find Dr. Good expressing his assent to such relations, and quoting Haller and Professor Schmidt in support of them. The earliest instance of pregnancy known to the writer was that of a young lady, who brought forth twins before she had completed her fifteenth year. Sir E. Horne knew two instances, in one of which a girl of thirteen, and in the other a girl of twelve, gave birth to children."

Dr. Baylies says of Elizabeth Drayton that "she was tolerably healthy during gestation, but had rather a lingering time at her confinement, which lasted two or three days, though perfectly natural." On the 28th of April, 1861, the child weighed forty-six pounds, and was three feet five inches high; he was remarkably strong and healthy both in body and mind for a child of his age.

Against the facts of this case there cannot exist the shadow of a doubt.

In this climate there are cases where the catamenia is delayed to from sixteen to eighteen and even twenty years of age. When such delays are not caused by disease, they result mostly from a tardiness in the development of the ovaries; occasionally they occur from anatomical defects.

About fourteen years of age is the aggregate period of puberty in this latitude, and it is announced by the symptoms of its accompanying physical and moral changes in the individual—which are lassitude, more or less headache, a pain and dragging sensation in the loin, some chilliness and fever, excited pulse, thirst, variable appetite, &c. In two or three days a discharge from the vulva will appear, at first but slightly colored, but gradually growing darker and darker until it becomes the color of blood,—though this may not occur again for two or three periods. The first effort may not be marked by any discharge whatever, the symptoms passing off without any; at the next or a subsequent period, the discharge, as described, will appear. Sometimes a full discharge of the proper color and consistency comes on at first. The function, when once established, manifests itself, in perfectly healthy individuals, regularly every twenty-eight days. Sometimes it is unattended, from the first, with the least pain or uneasiness whatever; at others it will be preceded for a day or two, and perhaps accompanied, by great suffering. In some women the menses come on at the proper period, continue the usual time, without pain, and pass off amid the most intense agony. In consequence of so many deviations from the healthy regular standard, menstruation has very properly been said to occupy middle grounds between physiology and pathology.

Each menstrual period continues from four to six days, as a general rule; there are instances, however, of its not lasting longer than one day; and again of its being prolonged to eight or ten days. The quantity discharged at each nisus is estimated at from four to six ounces; the means of arriving at even an approximation to the exact quantity are so imperfect, that the estimates in regard to it are very uncertain and unsatisfactory. There is one fact, however, that cannot be disputed, and that is, there is a great difference in different individuals, and in the same individual, at different times. Sometimes, and in some cases, the discharge is very

scanty, not exceeding, perhaps, one ounce; at other times, and in other cases, it is very profuse, amounting to six or eight ounces, or even more; but in a vast majority of instances a medium quantity is observed.

The time of the first appearance of the menses, the duration of the periods, and the quantity lost, are materially influenced by habits of life and modes of living. Girls reared in the country, with plenty of fresh air, exercise and plain diet, who keep regular hours and avoid excesses, approach nearer the medium condition, in regard to these particulars, than those brought up in cities amid ease and luxuries, accustomed to close warm rooms, warm feather beds, rich stimulating diet and drinks, attending balls, parties, theatres and other exciting and crowded assemblies; who keep their imaginations excited by reading tales of love, and other voluptuous indulgences. Such are usually precocious, have protracted, painful menstrual periods, and excessive discharges.

The present system of education is detrimental to the well-being of young girls. The close confinement during school hours, and over-tasking their minds, during the intervals, with a multiplicity of studies, deprives them of the enjoyment of that active exercise and mental hilarity so much craved, and so imperatively demanded at that particular age, when life and frolic and fun are almost as essential to the healthy development of the organism, as food itself. The educational courses, as at present instituted, rigidly enforced, tends to retard the development of the ovaries, and consequently the menstrual function, and the young girl who should be full of life and health and spirits, beautiful and bright, is dull, pale, nervous, anaemic, dyspeptic, and in a word, a confirmed invalid.

Disease, as consumption, scrofula, inanition, etc., retards the period of puberty, and the girl of sixteen or eighteen, except in height, presents none of the physical or mental qualitics of a woman.

All that was known of the cause or use of the menses, previously, to near the beginning of the second third of the present century was exceedingly vague and sparse. All the authors united in the opinion that they prepared and preserved the uterus for conceiving, because conception rarely, if ever, occurred before the appearance of the catamenia, and this was about all that was ventured upon

the subject. The part that menstruation plays in the great work of reproduction was not known. The cause and all pertaining to the physiology of the function were a sealed book, until about the year 1831, when the ovarian theory was established, and some of the hitherto hidden things of nature were brought to light.

As every step in the investigation, that resulted in the evolution of this great truth, was attended with the greatest difficulties, and the researches persisted in with unparalleled energy and perseverance, it is thought, that a concise history of the inquiry may not be considered uninteresting nor unprofitable. To Dr. Tyler Smith the student is indebted for the historical facts and dates contained in the following part of this article.

While the changes, both mental and physical, that take place in the young human female at the age of puberty, have been remarked through all past time, the function of menstruation, by which this period is indicated, has been enshrouded in the most profound mystery. It has been the theme of speculation for physiologists and philosophers from the days of Hippocrates to the present time. While the older authors indulged in all sorts of vagaries in regard to the phenomena and theory of menstruation, many of the more modern writers have been but a little more comprehensible or satisfactory in their views. Superstition, aided her twin sister, Ignorance, in investing this function with the most absurd and ridiculous notions, in regard to all the phenomena pertaining to it. Its cause, the character of the discharge, the location whence it emanates, its effects upon animal and vegetable health, the lunar influence upon its production, etc., etc., have all been subjects of grave discussion, and vague and senseless hypotheses. Galen and the older writers attributed the cause to *plethora*, averring that women were more inclined to it than men, and that an outlet was needed to drain off the superabundance of blood. Paracelsus, at the head of the chemical school, held that it was the result of *fermentation*, and even the more modern Cullen gave countenance to this preposterous hypothesis. As great a disparity of opinion prevailed in regard to the character of the discharge, as to every other phenomenon pertaining to the function. Hippocrates and Aristotle regarded it in its true light, and pronounced it blood; while others, because it differs in color from both arterial and venous

blood, being darker than the former and lighter than the latter, held it to be a fluid *sui generis*, instead of attributing its peculiar color to a mixture of the arterial and venous blood; from which circumstance its shade is derived. Even at the present day there are not wanting those who deny its identity with blood, partly on account of the fact already stated, and partly because of the absence of coagulability, one of the essential qualities of blood; forgetting that this deficiency is due to the chemical change that takes place, from its contact with the acid secretions of the vagina, during its passage along that canal. Experiments have shown that menstrual blood, received in a tube, direct from the os uteri, unmixed with the vaginal secretions, retains its coagulability and all the other properties of blood. Pliny and his contemporaries, regarding it with a superstitious awe, held it to be a noxious and dangerous poisonous exhalation, capable of turning milk sour, of wilting the flowers of a whole garden, and making a whole family sick, etc.

Velpeau, Deweese, and others, maintain that the cavity of the uterus is the seat of the discharge; while Columbus, Pineau, and Bohn, hold that it is the vagina and vulva. That the former are correct in their views, is proved by hundreds of cases of faulty passages, as impervious os and cervix uteri, while the cavity of the uterus has been found filled with blood.

The source of the menses has been a subject of as little agreement as any other matter connected with the function: one party declaring that they are supplied by the venous, another by the arterial capillaries, and a third that they are yielded by a special apparatus for the purpose.

A popular idea, which had its origin with writers on the subject, that the function is controlled by lunar influences, has, like many other medical fallacies, had its advocates and opponents in the past. Modern science, however, has so far dispelled the illusion, that it finds no adherents at the present day among intelligent medical men.

From the foregoing observations, it will be perceived that the theories of menstruation are as various as the minds that have been engaged in erecting them. Having no facts for their foundation, they are based upon hypotheses, and reared in error.

Physiological hypotheses, are more apt than otherwise, to lead to pathological errors, which, when pursued in practice, usually

produce results destructive to the health, if not to the life of the patient. Hence the importance of caution in accepting theories not based upon facts.

The ovular, the only true theory of menstruation, is the result of demonstrative experiment, extending over a lapse of more than three hundred years. This function, in its manifestation, being so dissimilar to any of the phenomena, pertaining to gestation and reproduction, in the inferior animals, comparative physiology, vivisections, &c., afforded but very little aid in its investigation. Autopsies of human females, dying during or near their menstrual periods, furnished the only means of pursuing the researches necessary to the collection of facts upon which to base a correct theory. Two circumstances combined to retard the inquiry, namely, the infrequency of death occurring at the auspicious time, and the repugnance manifested by surviving friends at the mutilation of their dead, especially in countries more superstitious than this, and in times less enlightened than the present. Hence, observations were made singly, and at periods far distant from each other.

The earliest recorded fact which caused the first beam of light to penetrate the hitherto profound mysteries of menstruation, was the discovery of the *ovarian vesicle*, by Fallopius and others, in the year 1550. For one hundred and eighteen years, this one fact, this first step taken, in the philosophic investigation of the mystery, stood isolated and alone, when it received an accession from the discovery of the indefatigable De Graaf, who saw the human ovum descending through the Fallopium, in 1668. Though Dr. Harvey, in his great work on the generation of animals, published in 1651, rendered no anatomical aid, the comparison he boldly enunciated as existing between menstruation and unimpregnated oviposition of oviparous animals, did much to direct the attention of investigators towards the great fact, that at each menstrual effort there was emitted an ovum, or egg. Though the knowledge he obtained by his vigorous researches, in regard to the conception and laying of eggs by inferior animals, was very great, the application of his theory to the menstrual function of the human female, was at the time wholly conjectural: but it was subsequently proved by visual observation to be a great truth. One hundred and twenty-nine years after De Graaf's discovery, and one hundred

and forty-six years after Harvey wrote, another link was added to the chain of research, that had been commenced, by Cruickshank, who, in 1797, examined a woman who died during menstruation, and observed a rupture of the peritoneal covering of the ovaria. He at the same time had in his possession the uterus and ovaria of a young woman who died in the same situation, with the peritoneal coat of the ovary ruptured, from which he suspected the escape of an ovum that had passed down through the Fallopian tube, and had been washed away by the menstrual fluid. Notwithstanding these observations, it never occurred to him to regard them as of any consequence in connection with the menstrual function.

The vesicle of the ovaria, though discovered by Fallopius, was afterwards more thoroughly studied and more minutely described by De Graaf, whose name it now bears, was mistaken for the real ovum. In 1672, Kerkringius published, in the *Philosophical Transactions*, his inquiries, in which the Graafian vesicles of a virgin ovary are called eggs. This was a grand error. Kerkringius, described an impregnated ovum in the uterus, the size of a black cherry, of which he made a drawing, and believed it to be the ovarian vesicle, (Graafian vesicle,) enlarged by impregnation. This was another error. The real ovum, (egg,) independently of the Graafian vesicle, had not yet been discovered, and the office of the Graafian vesicle was unknown. The disparity of size between this body, and the cavity of the Fallopian tube, created doubts as to the ability of the former, to reach the cavity of the uterus through the channel of the latter. Amid the confusion incident to the unsettled state of knowledge in regard to these organs, menstruation was viewed strictly as a uterine function, wholly independent of any ovarian agency. Thus, this important function escaped the grasp of physiological knowledge, and mankind remained in darkness respecting it; and consequently its pathology and treatment in cases of derangement; and woman was left to the mercy of the grossest ignorance and sheerest empiricism, so far as the disorders of her reproductive system were concerned, from which, to this day, she is not entirely exempt, as many writers and teachers yet adhere to the long list of menagogues, the legitimate offspring of past ignorance, that is still allowed to encumber the modern works on *materia medica* and *therapeutics*.

The view suggested by Harvey, namely, the escape of an ovum at each menstrual epoch, was revived and perfected by Dr. John Power, who published an essay on the subject in 1821. From his own observations and those of his predecessors, he came to the conclusion, which was then distinctly enunciated, for the first time, "that at every menstrual period an ovum reaches maturity in the ovarium, and is discharged from it during the flow of the catamenia." Though several important steps had been taken in anatomical investigations, tending to the results as stated by Dr. Power, they were by no means sufficient to definitely *prove* the fact enunciated. His was therefore a foregone conclusion; one of those instances of intuitive perception that we sometimes see manifested in a remarkable degree, when *theory* is made to precede a knowledge of the *facts* upon which it is based. His declaration, boldly conceived and fearlessly uttered, being in advance of the opinions of either his predecessors or contemporaries, brought down upon him the ridicule and contempt of the bigoted and envious of his time. Their opposition to the new theory and its author was marked by a malignity disgraceful to its possessors, and unworthy the profession to which they belonged. Their vindictiveness, in many instances, could only find vent in low personal abuse. In derision he was called "Menstruation Power."

Dr. Power, with true philosophic mien, disregarded the tumult his publication had produced, and like the majestic pine, that, "deep-rooted and strong," stands towering amid the whirling commotions of the storm, he remained tranquil and dignified, did not deign to reply to the objections of his adversaries, nor enter the arena of disputation; but, conscious of the soundness of his conclusions and the truth of his position, was content to wait for the revelation of time and farther research, to prove the correctness of his views, and establish the incontrovertibility of his theory. This has since been done, and later discoveries have been able to add but little to the theory of menstruation as promulgated by Dr. John Power, in 1821. This distinguished English physician stands before the profession and the world as the undisputed possessor of the honor of being the author of a great philosophical discovery; one that had baffled the wisdom of the soundest philosophers through all the past centuries. He, the first to enunci-

ate the great fact, that at each menstrual epoch there is matured and discharged an ovum, boldly proclaimed a newly-discovered truth, which inaugurated the true theory of this hitherto mysterious and inexplicable phenomenon. Ten years after, in 1831, Dr. Robert Lee reaffirmed the observation of Cruikshank relative to the appearance of the perforation of the peritoneum over the site of the Graafian vesicle in an autopsy, made on a woman, who died soon after menstruation.

Similar results of the dissections of four other cases were published by Dr. Lee in 1833. Though the peritoneal perforation in these several cases had been seen by this great Anatomist, and its presence could only be accounted for by the action of an escaping body, yet as this body (the ovum) had not been actually seen by him, he refused to believe in its existence. Like many other devotees of a positive philosophy, he accepted nothing hypothetically or inductively, but demanded actual demonstration as the basis of his belief. Though this exclusion of all hypothesis, and an adherence to experimental observation alone, as the true avenue to knowledge, may sometimes retard the progress of discovery, yet it is the safest ground to take in prosecuting philosophical inquiries. The ovum, enlarged by fecundation, that had been seen in the uterus by Kerkringius and others, and taken for the Graafian vesicle, was not recognized by Dr. Lee as the real ovum, on account of its size being so much greater than that of the Fallopian tube, through which alone it could reach the cavity of the uterus. The Graafian vesicle, at the time of its rupture, is about the size of a small pea, while that of the cavity of the tube, at its inner extremity, does not exceed that of a bristle. Though the true ovum had been discovered by Baer in 1827, and the only remaining link in the chain of discovery supplied, yet it had not been seen by Dr. Lee, and he persistently determined not to go one step further than his own observation. Like his predecessors, he rejected the belief in its existence, and regarded it as an hypothesis unsupported by facts.

In 1827 Baer discovered a small body (the ovum) floating in the Graafian vesicle. This gave a true significance to the latter organ, and assigned to it its proper office in the reproductive economy, namely, that of the *ova sac*. This completed the anatomical

structure of Dr. Power's theory, and left him nothing to add or detract; and had Dr. Lee, whose dissections contributed largely to the result, discovered the ovule of Baer, it would have rendered his knowledge of menstruation perfect. The size of the ovule, at maturity, is about the tenth of a line in diameter; this adapts it perfectly to the size of the cavity of the Fallopian tube, and thoroughly removes all doubts arising from the incompatibility of the size between the cavity of the tube and the Graafian vesicle. This final discovery of Baer was soon followed by the testimony of Gendrin, Racibroski, Mayo, Girdwood and others, to the truth of the escape of an ovule from the Graafian vesicle at each menstrual period, and established beyond the reach of successful controversy, the great truth of the present ovarian theory of menstruation.

This furnished the basis of further research in the direction of the reproductive process, which threw a flood of light on comparative physiology, and established the analogy between menstruation in the human female and oestruation (heat) of the lower animals. Professor Bisehoff has shown most conclusively that at the oestral period of animals (the period of heat) ova saes are ruptured whether the male be admitted or not.

With a view of bringing this protracted investigation within narrower limits, and presenting it in a more condensed form, the reader will pardon us for recapitulating the dates at which the various points of discovery were noted, and which mark important eras in the study of this very interesting branch of human physiology. The first discovery, that of the *ovarian vesicle* (afterwards called the *Graafian vesicle*), by Fallopius and others, was in the year 1550. The next was made by De Graaf, who saw the *ovum* descending through the Fallopian tube, in 1668. Kirkringius saw the impregnated ovum in the uterus, in 1672. Dr. Harvey first directed attention to the analogy between human menstruation and oviposition of oviporous animals, in 1651. Cruickshank observed the rupture in the peritoneal covering of the ovary, caused by the escaped ovum, in 1797. Dr. Power, in 1821, published the true theory of menstruation, though at that time not wholly supported by experiment. In 1831, Dr. Lee observed the ruptured peritoneum over the site of the Graafian vesicle, and

in 1833 published four similar cases. In 1827, Baer perfected the theory of Dr. Power, by discovering the ovule in the Graafian vesicle—one or more of which, in a matured state, escaped at each menstrual period. The ovum had been seen passing through the Fallopian tube, and in the uterus, enlarged by impregnation, but was not seen in the Graafian vesicle in the ovary, until discovered by Baer, in 1827. This was the crowning point in the great work of discovery that swept away forever the fog and mystery that had hitherto enveloped the function of menstruation, and presented it in its native simplicity, as merely in egg-laying process.

Now, since the existence of the human ovum has been demonstrated, the mysteries, fallacies, and superstitions, with which the ancients, and some of the moderns, have invested the act of *conception*, have been dissipated, and that grand old process is recognized only as the fecundation of an egg.

Notwithstanding this whole subject has been rendered transparent by the light of modern science, yet there are many distinguished teachers and writers who, adhering to the old time notions, repudiate the ovula theory, as failing to account for all the phenomenal aberrations to which it is known menstruation is liable. Dr. Ritchie, of Glasgow, "has ascertained from dissections of numerous females, who had died at all periods of life, and under all circumstances, that ova sacs are occasionally ruptured, and ovules expelled in *childhood*; and at other times, than the menstrual period, in women during the child-bearing era; and that in some cases the ovarian excitement accompanying menstruation does not proceed so far as to rupture the peritoneal coat and the shedding of an ovule." Dr. Tyler Smith, in reply to the above, says: "The conclusion I should draw from Dr. Ritchie's paper is, that in certain cases the ovarian action of menstruation is incomplete; that though it excites the catamenia, it is insufficient to cast off an ovule. The ovules shed in the intervals between the catamenial periods, without any uterine discharge, are probably either immature like those of childhood, or they may escape from the ovaries without a sufficient degree of ovarian excitement to set up the catamenia, being in this respect the antithesis of those other cases in which there is the uterine secretion, without the extrusion of ova from the ovarium."

In perfect menstruation, both ovarian excitement and the escape of an ovule concur, but the ovarian excitement is indispensable. Dr. Richie and his disciples, who seem to oppose the ovular theory more from a desire to combat a newly-discovered truth, than from any proof drawn from anatomical or physiological observations, have a full refutation of their views in the few foregoing remarks of Dr. Smith.

Menstruation, when perfectly normal, is suspended during pregnancy and lactation. Occasionally cases occur when something resembling the catamenia is present during the first two or three months of pregnancy, and in a few rare instances it has been known to continue regularly throughout gestation. One case of the kind was known to the writer; the children, five or six in number, were all small, thin and poorly developed. Lactation interferes with menstruation less frequently than gestation. Women often nurse their children and menstruate at the same time, after the third or fourth month.

Is it a Secretion? It has been the custom of authors, with a few exceptions, from time immemorial to the present hour, to denominate the menstrual fluid a *secretion*. This is evidently a misnomer, and not a harmless, unimportant one, but one calculated to deceive and mislead the intelligent and inquiring student, who looks upon his teachers and text-books as oracles of instruction, every decision and declaration of which he regards as authoritative and final.

In the past, when the uterus was considered a gland, and the secretion of the menses one of its functions, the term was sufficiently appropriate. But since it has been demonstrated to be a hollow muscle, it is highly inappropriate, as muscles are not a secretory apparatus. But we will be told that it is lined with a membrane that is secretory. Very true. But demonstration has proved *that* to be a mucous membrane, and these in a normal state do not secrete blood, nor anything analogous to it, any more than does the muscular tissue. The function of mucous membranes is to secrete mucus and that constantly, and not mucus one day and blood or something else another; nor mucus twenty-four days and blood or something else four days, and this successively and regularly for thirty years. No other mucous membrane in the body is charg-

able with such wild freaks. But we may be told that the peculiar functions of the uterus exert a controlling influence over this membrane and modify its action. It may be asked, what are these peculiar functions, and *how* do they act, to produce such a result? *Positive knowledge* is desired on this point; hypothetical assumptions have misled the world long enough.

As there has been no appropriate secretory apparatus discovered in the uterus, for the production of the menses, to denominate it a secretion is to speak without a warrant so to do. In the present state of our *knowledge* of this function it can be regarded in no other light than an instance of simple exudation, the mere transuding of the blood through the textures of the venous and arterial capillaries, a case of pure exosmose. Velpeau, who has investigated the subject thoroughly and discussed it ably, comes to this common-sense conclusion: "The menstrual *blood* escapes from the womb by exhalation or by perspiration, as in all hemorrhages of the mucous membranes, but without our being able to learn whether it transudes from the venous rather than from the arterial capillaries, and *vice versa*." The color of the menstrual blood being neither that of the arterial nor venous, but that of a mixture of both, makes it conclusive that both contribute alike to its production. Velpeau is sustained in his position by Madame Boivin, M. Monreau, and others equally eminent.

Notwithstanding the entire absence of all anatomical data upon which to rest the hypothesis, and the freely expressed convictions of the distinguished physiologists just named, later authors still persist in calling this *blood* a secretion, and thereby mislead the mind of the student.

When the ovum approaches maturity, towards each menstrual period, its increasing size produces an irritation in the ovary, the capillaries become engorged with blood, and the ovary enlarges by the turgid vessels; the uterus sympathizes with the ovary, through reflex nervous action; its lining membrane is found to be in a state of congestion, involving the capillaries of the uterine substance; the organ becomes perceptibly larger and heavier, which sinks it lower down in the vagina. At this time, and during this condition of these organs, the female experiences the symptoms of her approaching "sickness," as it is often called, such as have been

heretofore described, and perhaps others not enumerated, as they vary considerably in different individuals ; and in some instances, not the least inconvenience whatever is experienced. As the ovum advances from day to day towards full maturity, and its consequent escape, the ovarian and uterine excitement increases, the symptoms, which are purely neuralgic and sympathetic, increase in severity ; the mammae very often are also brought into sympathy with the ovary and uterus, and they become more or less swollen and painful. While these sympathetic and distant phenomena are being manifested, the ovum is pressing its way towards the surface of the ovary; the peritoneal coat is finally perforated and it escapes into the fimbriated extremity of the Fallopian tube. It being the cause of the ovarian excitement, which aroused all the reflex actions that showed themselves in those sympathetic manifestations, as soon as it leaves the ovary, the excitement subsides, which is attended with a subsidence of all the sympathetic phenomena, followed by a state of local and general relaxation exactly proportioned to the excitement. During this relaxation, in which the capillaries of the uterus are involved, the blood which had stagnated in them oozes or transudes through the textures of the fine vessels, into the cavity of the uterus, and passes off as the menses or catamenia. The time required for the disgorgement of the capillaries is about equal to that of their congestion. The female generally begins to experience the symptoms of her approaching period from four to six days before she "sees anything," and it requires about that time to terminate it. After it is over she returns to her usual state of health.

In a perfectly healthy condition, the greatest quantity of blood is discharged during the first two days of the nisus; after that it gradually decreases in quantity, and becomes paler and paler as it diminishes until it finally ceases. While this is the course observed in a great majority of cases, there are numerous deviations from it, each exception having its own peculiarity in regard to time, symptoms, quantity, etc.

The menstrual function ceases about the age of forty-five, sometimes in delicate women it terminates much earlier, say thirty-five or thirty; the writer knew of a case where menstruation did not recur after twenty-eight. This was over thirty years ago,

and the woman is living yet and in good health. Sometimes it is prolonged to fifty, fifty-five, or sixty. Cases are reported of women re-menstruating, after having been many years exempt from it. A case has been recently mentioned of a woman who menstruated, conceived and bore a child, prematurely, at seven months, after she was seventy-five years old. The authenticity of this case is not vouched for.

The menses sometimes cease, with but very little inconvenience, the only observable difference being more or less irregularity for a few periods towards the termination of the function. At other times there are considerable pain and flooding, with more marked irregularity. Again the cessation is attended with severe pain, exhausting hemorrhages and serious constitutional disturbances, resulting in permanent or transient melancholy or insanity.

This epoch is termed "the change of life," and is favorable to the development of cancers, and such other malignant diseases of the genital organs, as may have laid dormant during menstrual life.

At puberty there commences a series of evolutions, in the young girl, which vies in beauty with the gorgeous unfoldings of the most cherished exotic, and which surpass in interest the most valued of earthly things. This is the period of all others, that draws forth the kindest emotions of paternal love, and awakens in the parent's mind the most tender solicitude. All the anxieties of the past are culminated here; here all the apprehensions of the future germinate; here all the desires, feelings and enjoyments of childhood wane, and here are started thoughts, wishes and affections, strange and unexperienced before. The recklessness and confidence that characterized the child, now give place to thoughtfulness and caution. She for the first time recognizes the selfhood of self, and the responsibility of individuality, hence a shrinking, retiring disposition is observed to govern her actions; modesty, that germ of character and pride of woman, now controls her movements. The laughing, romping, chattering child is rapidly transformed into the shy, retiring, thoughtful young lady.

A greater metamorphosis, if possible, takes place in the physical than in the mental condition of the young creature. Commensurate with the catamenia, commences that series of changes

that moulds and beautifies the individual, and when united with the newly formed mental qualities, renders her of all earthly objects the most lovely and attractive. The eyes take on a softer and mellower radiance, the cheeks become fuller and reddened, the face rounder, the lips more prominent and of a brighter hue. The neck and shoulders fill up and become round, symmetrical and beautiful, and even the hair upon the head grows softer and more glossy. As has already been stated, the chest is ornamented by the enlarged and heaving mammae, which gracefully rise and fall with each respiratory movement, and contribute largely to the personal charms of their possessor. The whole trunk enlarges in due proportion, the abdomen becomes more prominent, and a more perfect roundness is given to the form. The out-spreading iliae give breadth to the hips, the mons veneris and labia pudendi increase in prominence and are covered with a coat of coarse hair, the limbs also participate in the general development and take on symmetrical proportions, and a beauty of finish that no art can imitate nor sculpture copy. The being before us is a newly developed *woman*—God's simile upon earth, radiant with intelligence, and glowing with moral purity, and in all civilized countries the object of man's fervent devotion and undying love.

CHAPTER III.

OF HUMAN CONCEPTION.

THIS subject, as well as all others relating to the reproduction of the human race, has, until recently, been shrouded in obscurity the most profound. You may explore the realms of learned lore, through all past times, in vain, for a satisfactory solution of the mystery. Much of the ideal and imaginative have been brilliantly elaborated, while but little that is philosophical has been transmitted to us. Many have been the *theories* advanced, but few have been the *facts* to sustain them. All that has been written

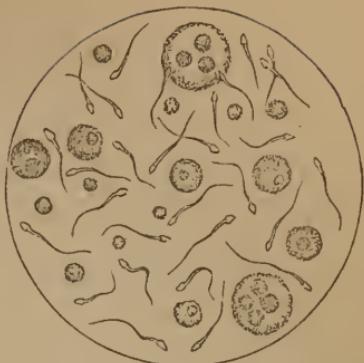
upon the subject may be comprised in three distinct propositions, viz. :

1. That the rudiments of the foetus are contained in the female.
2. That they exist in the male.
3. That the foetus results from a union of both.

That each of these systems has had its several supporters and antagonists, will not be surprising, when we consider the obscurity of the subject, as well as the extent of learning and brilliancy of imagination which have distinguished the several combatants. Harvey, the illustrious discoverer of the circulation of the blood, was an ardent supporter of the first proposition. The astute Leeuwenhook, who was first to perceive living animalculæ, or bodies resembling them, in the *semen masculinum*, has added lustre to the second; while Count de Buffon was distinguished as the chief advocate of the third. The first and second propositions have been so far abandoned as to have no defenders at present among intelligent physiologists. That conception is the result of the union of the products of the sexes, is now the universally received doctrine of medical scholars. But the when, where and how such a result follows the union, are matters of inquiry not quite so well established. The sexes are born by two individuals, viz., the male and female. Hence to effect generation, there must be an approach of the sexes. This first act in the process constitutes *copulation*. The object of this is the application of the fecundating principle of the male, to the germ furnished by the female. The result is fecundation and conception. The product furnished by the female is the *ovum* (egg), one or more of which escapes from the ovaria at each menstrual period. That furnished by the male is the *semen masculinum*, a semi-fluid product secreted by the testicles, and emitted and deposited in the female organs during the act of copulation. The ovum, when separated from its investments in the ovary, is about one-tenth of a line in diameter, and consists of a very delicate outer coat, called the vitelline membrane, the vitelles or yolk, the germinal vesicle and germinal spot. This little body, upon its escape from the ovary, is seized by the fimbriated extremity of the Fallopian tube, and conveyed by that organ into the cavity of the uterus.

The *semen masculinum* is a whitish semi-fluid, heavier than water, and consists of albumen, the salts of phosphoric and hydrochloric acids, and an animal substance called *spermatisine*. The microscope, of high magnifying power, divulges, also myriads of living, or apparently living animalculæ, called *spermatozoa*. In man they are very small, scarcely exceeding the eightieth or hundredth of a line in diameter. They have a body flattened and transparent, and a tail-like appendage, giving them a shape resembling the *porwiggle*, or tadpole. Whether the semen derives its fecundating power from the spermatozoa, or the fluid in which they float, is a question, in regard to which there is not a unity of opinion among physiologists. Some hold that, "during fecundation, they penetrate immediately to the ovule, and are there developed as a miniature embryo." Others contend that "the fecundating power does not belong to the spermatozoa, but to the seminal fluid, interposed between them." And others again join in opinion with Bory-Saint-Vincent, Valentine and Bischoff, that "the spermatozoa are solely destined to maintain the chemical composition of the sperm by their active motions." "They suppose that the spermatic fluid is a substance endowed with a chemical sensibility of such a character that, like the blood, it can only preserve its fecundating power while it remains in motion." The falsity of the first and most ancient of these hypotheses is abundantly shown by the changes that have been observed, under the microscope, to take place in the newly-fecundated ovum; these have been fully and graphically described by Bischoff, Coste, Barry and others, and show, that so great a metamorphosis of the ovum takes place, that not a vestige of its original elements can be traced after its first arrival in the uterus. Instead of the spermatozoon having been seen in the ovum, enlarged by development, two of the primitive constituents of the body, viz.: the germinal vesicle and germinal spot, are entirely ab-

FIG. 33.



MICROSCOPIC APPEARANCE OF HUMAN SEMEN, SHOWING THE SPERMATOZOA, AND GRANULES CALLED SPERMATINE.

sent, and the vitellus wholly altered in its consistency and constitution. These alterations are rather due to a change in the polarity of the ovum, than to the presence of an undiscovered, imaginary spermatozoon. Though Barry, from having observed a spermatozoon penetrating the ovum of a rabbit, was recently led to sustain this old theory, I trust we shall be able to show, in the conclusion, that the spermatozoa penetrate the vitelline membrane and enter the ova for a very different purpose, from converting it into a nest, in which it may repose and develop into a perfect living foetus.

That the spermatozoa do penetrate the vitelline membrane, and enter the ova, is proved by the concurrent testimony of many investigators. My friend, Dr. William Schmœle, of this city, recently showed me a drawing he made from a microscopic observation, while pursuing his investigations, some years ago, in Germany, of a human ovum, on the surface of which were a number of spermatozoa, in the act of penetrating the vitelline membrane. But whether the fecundating power is inherent in them, or whether they merely serve as porters to transport the fluid that surrounds them, and which is averred by some to be the fruitful element of the semen, to the ovum, or not, we have no means of proving. And whether the fecundating power of the semen, is due to its chemical properties or not, is equally conjectural. Upon these delicate points, in the absence of all data, we will not presume to venture a decision. While either of the foregoing hypotheses will subserve our purpose, it is of little difference to which we give preference; but, in view of all the facts at hand, in regard to the part played by the spermatozoa, we feel inclined to assign to them the honor of possessing the sole fecundating power.

The next point to be considered, is, the means and channels by which the semen is brought in contact with the ovum. That such contact is essential to fecundation does not admit of a doubt, in view of our present knowledge of the subject. The old hypothesis that fecundation takes place by sympathy or consent of parts, so strongly insisted upon by Dr. N. Chapman, when Professor of Obstetrics in the University of Pennsylvania, and others of that day, has long since been abandoned, and more intelligible, but perhaps no more correct theories have been erected upon the basis of

actual contact, of the two elements, namely, the semen masculinum and the ovum. Then, how is this contact effected? The vagina, uterus, and Fallopian tubes, constitute, the genital or reproductive canal. The ovum is received into this canal at one extremity, and the semen at the other; hence, the two elements must traverse the canal in opposite directions to effect a meeting. The ovum, by means of the peristaltic motion of the tube, is carried down towards the uterus, while the semen, which is deposited within the labia pudendi, during the copulative act, is carried along the vagina, up through the uterus, and enters the Fallopian tubes at their uterine extremity, and thus meets the ovum in its descent. While it is easily comprehended how the ovum may descend through the Fallopian tube, to account for the ascent of the semen, in an opposite direction, at the same time is a matter of rather more difficulty. It is supposed that its presence in the vagina excites the rugous coat to action, and a sort of gentle, rolling motion is set up, by means of which the semen is carried up to the os uteri. It may be said this arrangement is unnecessary, as, under ordinary circumstances, the semen is deposited in the immediate neighborhood of the os uteri by the male organ. But it occasionally occurs that this is not the case. Instances are not wanting, where portions of the penis have been removed by amputation, destroyed by syphilis, or lost by accident, when not more than an inch or even less, has been left to its possessor, barely enough to convey the semen within the labia, and pregnancies have resulted from such unions. The old notion, that in a fruitful coitus, the semen must be thrown at once, by a *vis a tergo*, into the os uteri, is not insisted upon by physiologists of the present day. Partly by the arrangement above indicated, or some other efficient mode, and partly perhaps, by the individual motions of the spermatozoa, the semen is carried to the uterus, enters the os, and in like manner is made to traverse the remainder of the genital canal until it meets the descending ovum. The time required for the ovum to travel the length of the tube, in the human subject, is not definitely known, but it is variously estimated from twelve to eighteen days. The spermatozoa, from their extreme diminutiveness, and the facility of transportation, are conveyed with far greater rapidity through the passages, than is the ovum; hence their op-

portunities for meeting it, in its slow descent are numerous and unequivocal. The fact of their having been seen, in great numbers, in the uterus, Fallopian tubes, and on the surface of the ovary by Bischoff, Wagner, and Barry, proves abundantly that these are the natural channels for the transmission of the semen to the ovum, and that the notion of there being a distinct apparatus for the purpose, in the human subject, as entertained by M. de Blainville, M. Cartner of Copenhagen, M. Baudelocque, Madame Boivin, Mauriceau, Dulaurens, Dewees, and others, is a sheer hypothesis, unsupported by a single observation, notwithstanding the array of illustrious names that give it their adherence.

Having endeavored to establish the facts, that fecundation is due to the presence of the spermatozoa, that their contact with the ovum is necessary, and, that the genital canal is the channel traversed in effecting this contact,—we now proceed to inquire when fecundation takes place after copulation. From the foregoing remarks, it will be perceived that some time must elapse after the semen has been deposited in the vagina, before it can reach the ovum in the upper passages, the length of which depends upon the position of the ovum in the Fallopian tubes; if it be near the fimbriated extremity, it will be proportionably shortened; so it cannot be uniformly the same in all cases. The difference in the time, is in ratio to the length of the channel to be traversed by the semen. How long it takes it to ascend through the whole extent of the canal, in the human subject, we have no exact means of determining,—but in the case of a young bitch killed and examined by Bischoff, twenty-four hours after copulation, living, active spermatozoa were found along the Fallopian tubes, in the fringe at their outer extremity, and upon the surface of the ovaries. From analogy, it would be fair to infer that the time, in woman, does not differ widely from that ascertained in the above experiment.

The old idea, that fecundation takes place at the time of the sexual embrace, and, that some sensitive women, from a peculiar sensation experienced at the time, can determine when the connection has been a fruitful one, is a fallacy that has been effectually exploded by the developments of modern science—though the exact time cannot be definitely stated, it cannot exceed twenty-four or forty-eight hours at farthest.

The next inquiry of interest is, what time is most favorable to fecundation, in view of the menstrual periods.

From the best data we have, it is estimated that the ovum is from twelve to eighteen days in passing through the tube to the uterus. A coitus during that time, or within that space of time, after a menstrual period, is most likely to be followed by the fecundation of the ovum then in transit. It is held by some physiologists, that it is impossible for fecundation to result from a connection effected after the time specified, or after the ovum has finally escaped from the uterus. This, observation and experience prove to be by no means correct. There are not a few instances where married women not desirous of having a further increase of their families, and unmarried girls, whose dread of consequences, among other considerations, restrain them from sexual indulgences, have been so far misled by books on popular physiology, and itinerant lecturers, who teach this doctrine, as to discover too late the consequences of their indulgences, to be unwelcome pregnancy. One case in point, will suffice to illustrate the position here taken, though many more might be given. A few years ago we were applied to by a young unmarried woman, of very respectable connections, and informed that she had missed her courses for the last two periods; upon inquiry, it was discovered that she had morning sickness, and other signs of incipient pregnancy. Upon being made aware of our apprehensions in regard to her situation, after some hesitation, she acknowledged that there might be some probability of their accuracy, but she could not see how it could be. She admitted that she had been guilty of an impropriety, but that she had apprehended no danger from that, as it was consummated at a time unfavorable to such a result. She stated that her regular period would have been the first week in January, and that she had *seen company* on Christmas night, and had been told that there was no danger, so long after her former period. Upon being informed that her case admitted of no relief, she returned home disconsolate enough, and in due time, was delivered of a fine boy. Here the embrace took place within a week or ten days of the approaching period, and conception was the consequence. You ask, how are such facts to be reconciled to the foregoing theory? We answer, they are in no wise irreconcileable. The semen is transmitted from the visiculae

seminalis to the vagina, without being exposed to the influences of the atmosphere, and without any change of temperature, it is deposited in a receptacle lined with mucous membrane analogous to that lining the vesicles; except the change of locality, its surroundings and conditions are unchanged, and there is no reason why it should not retain its fecundating power, in its new situation, as long as it would have done in its old, which may have been an indefinite length of time. This being conceded, it is easy to conceive how the spermatozoa may be retained, in a living condition, within the folds of the mucous membrane lining the genital canal, and come in contact with the ovum, cast off from the ovary, at the next menstrual period succeeding the sexual embrace. Though we have held and taught these views for the last fifteen years, we do not recollect having seen them mentioned by authors, until recently a copy of Dr. King's American Obstetrics accidentally fell into our hands, where we find the following: "As to conception following an embrace, which happened several days previously to the menstrua, I would suggest that it is possible; the vitality of the male semen or spermatozoons may be preserved within the female organs for some time, and consequently, if they thus exist until the period at which the discharge of the matured ovum occurs, contact between the two would effect its necessary result. That this is a reasonable view of the matter cannot be doubted, especially when we remember that Bischoff, Wagner and others, have found living spermatozoons in the vagina, uterus, tubes and ovaries of animals upon which they experimented, for some hours after copulation." A perfectly healthy condition of the female organs is essential to the end in view, as abnormal secretions would be likely to vitiate the integrity of the sperm, and render it non-productive. From the foregoing observations, it will be perceived that connection, had early after a cata-menial period, is most likely to be fruitful, but that there is no time during the interval that its consequences can be avoided with any degree of certainty.

The next question offering for our consideration is, Where is fecundation effected? Is it in the ovary, Fallopian tube, or the uterus? Since modern investigations have proved that contact of the semen and ovum are essential to fecundation, it is difficult to conceive how the latter can be effected while the ovum remains in

the Graaffian vesicle, protected as it is from intrusion, by: 1. The peritoneal covering of the ovary. 2. The proper ovarian tunic—a thick, firm, dense fibrous structure. 3. The three coats of the Graaffian vesicle; and 4. The fluid and granular cumulus in which it floats. While the spermatozoa have frequently been seen on the surface of the ovary, they have never yet been observed to penetrate these investments, nor to attempt it. They have never been found beneath the impervious peritoneal covering. It has never yet been shown that a *fecundated* ovum ever escaped from the ovary, though many distinguished names might be cited in support of this hypothesis, as Sir E. Home, Dr. Haighton, Mr. Burns, Baude-locque, Deweese, Gooch and others.

It is not the only instance where the weight of great names has been given in support of absurdities, which subsequent experiments have shown to be palpable. The notion entertained by Dr. Haighton, that the ovum was acted upon through sympathy, excited by the presence of the semen in the female organs, has more the appearance of being rational, than those held by his contemporaries and successors, who repudiated the doctrine of sympathy. This, though supported by the name of that highly distinguished American medical philosopher, Dr. Chapman, who for nearly a quarter of a century was the main pillar of the University of Pennsylvania, is no less a fallacy than many other scintillations from the brilliant genius of that illustrious teacher. The instances of extra uterine pregnancy that have from time to time occurred, as ovarian, tubal and abdominal pregnancies are cited as evidences of ovarian fecundation. As regards the first of these anomalies, we would remark that there is not a solitary authentic case recorded of a fecundated ovum having been seen in the impervious Graaffian vesicle, either of a human or animal ovary.

In every case of ovarian pregnancy given by authors, there has been a perforation of the peritoneal covering of the ovary, as also of the coats of the Graaffian vesicle, and the proper tunic, leaving an uninterrupted course to be traversed by the spermatozoa, in their search for the ovum. It is not difficult to conceive how an ovum may be retained in the Graaffian vesicle, after the aperture in its investments has been effected by the absorption of the parts thinned by its increased size, and that the spermatozoa pass through the opening and reach the ovum while yet in the ova sac,

and fecundation be the result. Such are the facts connected with ovarian pregnancy. Or should the ovum thus fecundated escape from the Graaffian vesicle, and miss the grasp of the fimbria of the Fallopian tube, it might fall into the cavity of the abdomen, and there be developed for a time, making a case of abdominal pregnancy. If it should be received into the Fallopian tube, and meet with sufficient obstruction there to arrest its passage to the uterus, it would develop to some extent, and constitute what is termed *tubal pregnancy*. These deviations from the ordinary course of fecundation and conception, have been triumphantly quoted to prove that fecundation takes place in the ovarian vesicle; but they, in fact, prove no such thing. All they prove is, that they are just what they are, viz., accidental anomalies, pathological conditions, and not the result of any physiological law.

Antecedent to the celebrated experiments of Dr. Haighton upon the rabbits, it was held that the corpus luteum "was an infallible sign of impregnancy having taken place," and that this body only existed in the cavity of the Graaffian vesicle, after the escape of a fecundated ovum.

Dr. Gooch says: "By the experiments just alluded to, it is shown that a corpus luteum is an effect of copulation, but not an infallible sign of impregnation." In making this assertion he only escapes one error to become implicated in another equally grave, as it is now known that the yellow body (corpus luteum) is found to occupy the cavity of the Graaffian vesicle, after the escape of the ovum at each menstrual period, as well in the virgin as in the married woman, and that it is not, as asserted by Dr. Gooch, "an effect of copulation." Cazeaux observes that, "although for a long time considered by nearly every author as an irrefragable proof of a previous conception, it is at present well known that this body may exist in a virgin girl, provided she has previously menstruated." This observation is based upon the experiments of Lee, Montgomery, and Patterson, of England; Raciborsky, of France; and Bischoff, of Germany.

Perhaps there never was a graver error in medical jurisprudence than that connected with the existence of the corpus luteum. For a long time it was held as the test of guilt or innocence, of purity

or pollution; and it is not improbable that the memory of the virtuous dead has frequently been blackened by medical testimony, based upon this, now exploded, fallacy.

Having now endeavored to show, from the anatomical position of the ovum, the utter impossibility of a contact being effected between it and the sperm of the male, during its continuance in the ovary, with its investments imperforate, and briefly reviewed the two prominent arguments in favor of the hypothesis, viz., that drawn from extra uterine pregnancies, and the presence of the corpus luteum, we leave the decision to the enlightened judgment of the reader, and proceed to examine the claims of the uterus to the honor of being the seat of the origin of human life.

The uterus, as we have already shown, constitutes a part of the reproductive or genital canal, through which all substances must pass from the Fallopian tubes to the vagina. Now, at each cata-menial epoch, an unfecundated ovum escapes from the ovary, is received in the Fallopian tube, conveyed to the uterus, through which it passes to the vagina, thence to the external organs, and finally escapes from the body. As all ova are unfecundated when they escape from the ovary, and are first received in the Fallopian tube, except in those rare cases of extra uterine pregnancies, which have been already explained, it may be asked why they are not *all* cast off from the body? Why is it, that some are retained, and others are not? All would pass off, did they remain unfecundated; but fecundation provides an arrangement for their retention. As soon as this is effected, there is found in the uterus, an opaque, rough, flocculent deposit, or membrane, called the *decidua*, (Fig. 51); this new-found substance lines the entire cavity of the organ, 1, 1, 1, and closes up all the apertures to it, so as to prevent effectually, the escape of the ovum 2, that is approaching it through the tube. When the ovum reaches the inner orifice of the tube, it comes directly in contact with the decidua, which arrests its descent through the uterus, and retains it at or near the point of its entrance, at which point it forms an attachment to the inner surface of the uterus, where it remains during the term of pregnancy. As the embryo develops, and the ovum enlarges, it pushes away that part of the decidua with which it is in contact, forming a second fold or layer, called the *decidua*

reflexa, while the outer layer is called the decidua vera. This membrane is also called the caduca; the external layer, the external caduca, and the internal, the internal caduca. Authors of different nations have given it different names.

Its origin, development and use, are matters of far greater interest to the physiologist, than the titles by which it is designated. Whence it emanates, and how it is formed, are points that have, through all past times, enlisted the speculations of physiologists, without arriving at any very satisfactory results. One thing in regard to it, however, is known, and that is, it is produced in consequence of fecundation; it never exists without it, and is always present with it, whether in uterine or extra uterine pregnancies. But how the fecundation of a simple vesicle, not larger than a mustard seed, having no organized attachment to any part of the organism, but simply passing through a hollow cavity, should produce such astonishing results, remains a mystery, to be solved by some future genius. That its use mainly is, to retain the fecundated ovum in the uterus, and, perhaps, to assist in its sustenance, until it has time to effect its own attachment to the maternal structures, is evident. From the foregoing facts it must be apparent that fecundation cannot take place in the uterus, because, if the unfecundated ovum should arrive in the cavity of that organ, and there be present, no decidua to retain it, it would pass off, as is the case with the ova, at each menstrual period.

Notwithstanding this anatomical impediment to the process in the uterus, no other organ was ever suspected of being in the least implicated in the reproductive process, previously to the investigations of the functions of the ovaries by De Graaff, in the latter part of the seventeenth century, which were, subsequently, repeated and verified by Dr. William Hunter and Cruickshank, his favorite pupil. Although these early investigators did much to enlighten the world in regard to the philosophy of reproduction, many of their conclusions have since been proved to be extremely erroneous, some of which errors have been transmitted to the present time, and continue to be entertained.

If fecundation does not take place, in either the ovary or the uterus, the intermediate organs, viz., the Fallopian tubes must be the part assigned to the important duty of protecting the ovum

during the delicate change that takes place within it, converting it into the life-bearing rudiments of a new being.

Cazeaux says: "Pending its stay in the ovary, the ovum underwent no appreciable modification; but as soon as it has entered the ova duct (Fallopian tube) the beginning of those changes it must necessarily pass through, in order to give birth to a new being, is observed." Barry, Bischoff, Coste and others, by a most persevering application to the study of the various modifications of the fecundated ovum, in the Fallopian tube, by means of the microscope, have thrown a flood of light on the subject, and made diagrams, illustrative of the changes that, from day to day, occur, during its descent to the uterus. These diagrams, with a concise description of the experiments on animals, rabbits and dogs especially, connected with their production, are published in several standard works on obstetrics and physiology, at the present day. As the human ovum and that of the latter animal bear a strong resemblance to each other, both in the unfecundated and fecundated states, and as other circumstances attending both are analogous, the progressive changes in the former are inferred, from the observed modifications of the latter.

The conclusion, that fecundation *must* occur in the Fallopian tube, is not drawn entirely from the negative evidence, that it *must* be so, because it cannot be effected in either the ovary or the uterus; but upon many experiments made on several specimens of the mammalia, including woman, and the uniformity of results being so universal, we are, unavoidably, compelled to accept it as a fact in regard to her.

Our inquiries, thus far, have been aided by the opinions and experience of others, and a knowledge of the when and where fecundation occurs, has been arrived at; and that degree of certainty attained, that experiment and observation alone can furnish. But when we ask the question, *how* is the change in the ovum effected by its contact with the sperm, we wait in vain for an answer. Many futile attempts have been made, during past ages, to raise the curtain that enshrouds the process in a mystery hitherto too profound to be fathomed by human ingenuity, but subsequent observations prove them to be as fallacious as they were incomprehensible. So we are left alone to pursue our

inquiries, with no friendly guide-board to direct, no sympathizing cotemporary to encourage us. We then boldly launch our little bark, and, solitary and unprotected, commence our voyage of inquiry. We have not even the light of an intelligently expressed hope of success, by any one, to aid us, but are compelled to steer our vessel through the gloom of doubt and despair thrown in our course by some of the latest and best authors on embryology. Cazeaux, in utter helplessness, exclaims : "How, from this contact, a new individual is produced, it is, and, probably, ever will be impossible to explain." This is but an echo of the sentiments of many others who have proceeded thus far with their inquiries, and then wrecked their bark upon the rocks of dark despair. The correctness or truth of what we are about to offer, cannot be brought to the test of our senses, because the means employed are both imponderable and intangible. In the absence, then, of our ability, from the nature of our subject, to adduce demonstrative, experimental proof, we will be obliged to rely upon reason, deduction and analogy to convince the reader of the soundness of our positions, and correctness of our views. In submitting our peculiar ideas, which we claim as original, to the criticisms of the learned and philosophical, we ask for them neither mercy nor favor, but are content to leave them to their fate: if they shall prove to be indefensible, let them fall; but if they are based upon truth and science, they will withstand whatever assault may be made against them, and become stronger instead of weaker, from the contest they may encounter.

How, then, is fecundation effected? We answer, it is nothing more nor less than a *change of polarity in the ovum, induced by electric action.*

Electricity, says Prof. Silliman, "is the ethereal, imponderable power, which, in one or other of its forms, affects all our senses." "It appears, so far as our knowledge goes, to extend throughout nature, and is, probably connected, inseparably, with matter in every form." "It is assumed to pervade all nature, and to exist in a state of combination or electrical quiescence in all bodies, in their natural state. This quiescence is disturbed by friction and various physical and chemical causes." "Bodies, in their natural state, give no evidence of its presence, but by different means, it

may be evoked from all. Hence, *statical electricity* implies that condition of this subtle ether existing in all bodies in a state of *electrical quiescence*.

"*Statical electricity* is the opposite of that state of excitement following friction, chemical action, &c., which is called *dynamic electricity*, or *electricity in motion*." When the statical, or quiescent electricity of a body is disturbed or excited, it is said to be electrified. There are two kinds of electrical excitement, the *positive* or *vitreous*, and the *negative* or *resinous*. Two bodies excited, positively or negatively, repel each other when brought together. While one being positively, and the other negatively, excited, when brought within the reach of each other's electrical influence, attract each other, and remain in contact during the continuance of the electrical conditions that first brought them together. "The researches of Galvani early established the existence of currents of electricity in the animal organism, flowing from the external, or cutaneous, to the internal, or mucous surfaces of the body." The positive and negative electrical excitement manifested in a body, is found not to consist in the quantity of electricity present, as held by Franklin, but in the quality, as averred by Du Fay. "A flattened body, as a plate, may possess the two electricities, on its opposite sides, one being positive and the other negative. A rod, by a simple process, may be made positive at one end, and negative at the other." The terms positive and negative are only relative ones; one body may be positive to another, yet negative to the third; or, the first may be positive to the second, and the second positive to the third. These electrical conditions are not uniform, invariably, but may be changed and diversified, by time, circumstances, and the means employed to excite them.

We give these few propositions and laws pertaining to and governing electricity, as data upon which to base our subsequent observations.

As we have shown, from the researches of Galvani, the animal organism is not free from its electrical currents. As regards the sexes, the male, in general, is positive and the female the negative. That there are exceptions to this rule we readily admit. A female may be negative to one male, and positive to another; or, the two

may possess similar electrical conditions, and both be positive or both negative to a third party; or, these conditions may become changed by age or sickness, or other disturbing influences, and a dissimilarity of electricity be established between them, when we will have one positive and the other negative. Animals are no less amenable to the laws of electricity than other bodies. We assume, then, as a general law, that the male is positive, and the female negative. We have shown, according to the experiments of Du Fay, that a body may be one part positively, and another negatively electrified at the same time. During the excitement of the ovary, induced by the maturation of the ovum, may not the ovary become positively electrified, while the Fallopian tube remains negatively? thus having one body positively, and the other negatively electrified, and being in close proximity to each other, the fimbriated extremity of the tube is attracted to the ovary, and to that part the most intensely excited, viz.: the site of the Graafian vesicle, a persistent contact is effected, which continues during the ovarian excitement. Immediately, upon the ovum's escaping, the excitement subsides, the electrical state of the ovary is changed, it again becomes negative, similar to that of the tube, which is repelled from the ovary, carrying the ovum with it. Does this not explain the hitherto inexplicable action of the Fallopian tube during the menstrual period of the human female, and the period of heat in the lower animals? If this does not fully explain this mysterious phenomenon, it certainly approximates it nearer than any other hypothesis with which we have hitherto been furnished.

The matured ovum, having derived its electrical condition from that of the general system of the female, is negative. It having entered the tube through electrical agency, is carried down through its cavity by a mechanical action, before explained. Its electricity may be of greater or less intensity, according to that of the female. The semen masculinum, deriving its electricity from the male, is positive. This being deposited in the vagina, while the ovum occupies the tube, is propelled along the genital canal, in the manner heretofore described, aided, perhaps, by electric attraction. We here stop to examine a question that fair criticism may, very properly propound, viz., the spermatozoa, the essential element of fecundation in the semen, being positive, and coming in contact with

a negative body, viz.: the vaginal surfaces, why do they not yield their positive excitement, or electricity, to their negative surroundings, agreeable to a simple law of electricity: that bodies dissimilarly electrified tend to restore an equilibrium? This requires us to pause a moment, to examine into the organization of the spermatozoa, and see if they are amenable to this law. Carpenter says, in page 749, par. 842: "The principal component substance of the mature spermatozoa is the same with that which is the chief constituent of the epithelia and of the horny tissue generally, named the 'binoxide of motein,' of Mulder." Now, from the constituents of the spermatozoa, they are non-conductors, a class of bodies that receive and part with electricity very slowly, and when touched by a good conductor, the excitement is only removed from the part touched. Their composition, then, protects them from the operation of the law above stated, and enables them to traverse the canal, freighted with the elements of life, undisturbed. They pass up through the uterus, enter the Fallopian tube, and meet the ovum, a body more intensely excited, negatively, than the structures over which they have passed: they are attracted to it, a contact effected and rendered persistent by electrical attraction, they penetrate the vitelline membrane, now surrounded by and immersed in a fluid negatively electrified, they give off their positive excitement, a new electrical condition is excited in the ovum, *and this constitutes the rudimental life, or spirit of the new being;* by this the polarity of the ovum is changed, a new molecular action established, which rapidly modifies the entire body, and changes its elementary constituents, as can now be readily perceived, and the successive changes watched, from day to day, under the microscope. Thus, we have endeavored to show that fecundation, with all its mysteries and obscurities, is but a simple result of the operations of the great law of attraction and repulsion, without which all things would cease to be, and by its beneficent operations all things continue to exist.

Other difficulties encountered, in contemplating the reproductive functions, can be removed, other mysteries solved, and other obscurities rendered lucid, by the application of the foregoing theory. Cases of *apparent* sterility are occasionally met with, such as man and wife, both healthy and vigorous, living together and co-habiting

for years, say from five to twenty, without issue, and at the expiration of this time, the wife conceiving and bearing children. These cases often give rise to unpleasant and disreputable suspicions in the minds of mischievous gossips, whose tattling propensities are gratified by creating and spreading slanderous reports, frequently involving characters far better than their own.

In such instances, at first, there is a similarity of electricity that is neither positive nor negative to the other; and as bodies, similarly electrified, repel each other, the ovum and sperm, being alike, are thus repelled: hence, as there is no electrical change effected in the ovum, there can be no fecundation. But, in process of time, either by the operations of age, difference of habits, occupation and exercise, an attack of sickness, or from some other cause, one of the parties, and it matters not which, becomes, more or less, impaired in health and vigor, by which the electrical condition becomes changed. One now being positive and the other negative, the wife soon gives evidence that her reputation for sterility was groundless and false.

Cannot the production of the sexes be accounted for upon the same hypothesis?

As it requires the positive and negative to fecundate the ovum, one of these conditions, whichever preponderates at the instant of fecundation, is incorporated with the newly evolved vital spark, and is reflected upon the new being, stamping it either as male or female according to the preponderance of the polarizing cause, of the father or mother.

Human existence is a combined quality of the physical and psychical. The highest, and ultimate object of physical existence is the reproduction and continuance of the species, to which all other physical considerations are subordinate. The highest and ultimate object of physical existence is a preparation for immortal life, to which all intellectual, moral and religious considerations are subordinate. These two propositions embrace all the duties of life.

Physical health and comfort, involving the thousands of real or fancied means of attaining them, are essential to the perfect consummation of the first. And high intellectual, moral, and religious culture and development, involving the thousands of real or imaginary means of attaining them, are essential to the perfect consum-

mation of the second. And the nearer we approach the perfect consummation of these two objects, the nearer we approximate a state of perfect happiness.

The essentials of these two propositions are so intermingled with human existence, as to become a part of it. Human electricity emanating from, or pervading this combination of the physical and psychical, becomes the representative of the whole, and, that exciting the spermatozoa, and ovum, being if we are allowed the expression, the concentrated quintessence of humanity, and that, perhaps, intensified during the sexual excitement, by the act of fecundation, plants *all* the elements of human nature with their varied significance in the rudimental being, which its presence originates. Hence the physical differences, and mental peculiarities of individuals, and races, and the family resemblances, physical and psychical, that are everywhere acknowledged to exist. If this does not approximate the rationale of the phenomena and philosophy of fecundation, we acknowledge our inability to comprehend this singular concatenation of circumstances and facts, including the laws of electricity, and even the composition of the spermatozoa, pointing so unequivocally and strangely in that direction, to no purpose.

It will be perceived that we have used the word *fecundation* in contradistinction to *conception*. Fecundation is not conception. An ovum may be fecundated, and pass off. Fecundation may take place near the uterine extremity of the tube, and the ovum enter the uterus, before there has been sufficient time for the formation of the decidua: in this case, it would pass off, as though it had not been fecundated at all. Conception is where the fecundated ovum is retained, and becomes attached to the internal surface of the uterus.

Dr. Tyler Smith makes a distinction between "impotency" and "sterility," as applied to the reproductive capacity of women: he restricts the former to those cases where the sexual orgasm or spasm is not induced by coition, but where conception is the result. Hence, granting a woman may conceive, though she be impotent, notwithstanding the opinions of some eminent authors, that the orgasm is necessary to conception.

Some hold that all women are impotent, denying the existence of the orgasm even to all women. This is as great an error as the

former : most women experience the orgasm, some in a greater, and others in a less degree. But, that it is not essential to fecundation and conception, is abundantly proved, in cases of suspended sensation, as in paraplegia, etc. While it does not contribute to fecundation, it is an incentive to coition ; for those who experience the greatest sexual enjoyment, are the most prolific.

Neither the physiology of coitus, nor the accompanying, nor resulting phenomena, are not properly understood, or there would be fewer grave contradictions, and more uniformity of opinion in relation thereto. Coitus is regarded in too degraded a light, to elicit the higher thoughts, and profound study its importance should insure. Viewed in any other light than a divinely intituted economy, for the fulfilment of the highest and grandest of nature's appointments, viz. : the reproduction of man, the individualization of all that is grand and great in human existence, and all that is holy and pure in angelic life; viewed in any other light than a means instituted by God himself for effecting His highest purpose, the organization of His counterpart in image, and His second only in attributes—is to detract from it the sacredness of its purpose, and the grandeur of its mission. Associated in degradation with it, is woman, Heaven's appointed agent for consummating these results, so profoundly grand, and transcendently glorious. She, whose high destiny it is, to produce through pain, and nurture through patience, a being divine in image, and God-like in endowments, should be regarded with the greatest respect, and crowned with the highest honor.

The desire for sexual gratification, in the lower animals, is instinctive entirely, and pursued with the wild instincts alone, while in the human mind it is softened, elevated, and purified by the halloving influence of conjugal affection: this should be the only magnetic cord to draw together two, in the sexual embrace, in view of the good of the resulting progeny. Dr. Carpenter, very properly and truly remarks, "In proportion as the human being makes the temporary gratification of the mere sexual appetite his chief object, and overlooks the happiness arising from spiritual communion, which is not only purer, but more permanent, and of which a renewal may be anticipated in another world,—does he degrade himself with the brutes that perish. Yet, how lamentably frequent is this degradation!"

CHAPTER IV.

GESTATION.

GESTATION (from L. *gestatio*, G. *φορά, phoga*, to carry), the time and the act of carrying the embryo and foetus in the uterus from conception to parturition.

It will be perceived that this definition presents two subjects for study: 1. That which relates to the embryo and foetus, 2. That which relates to the woman.

The first is denominated *Embryography* (from *ἐμβρύων*, *Embryon*, Embryo, and *γραφή*, *Graphe*, description). A description of the embryo; embryo (from *ἐν*, *en*, in, and *βρύω*, *Bruo*, I grew). I grew in. It is sometimes called *Embryology* (from *ἐμβρύων*, *Embryon*, Embryo, and *λόγος*, *logos*, a discourse,) a discourse on the Embryo. For a written description the first is a much better term. It embraces all that pertains to the development of the embryo and foetus. The second is denominated *pregnancy* (from L. *prœgnans*) being with young. The investigation of this subject includes all the phenomena belonging to the function that pertains to the woman.

EMBRYOGRAPHY.

The student by this time must have become familiar with the movements of the ovum, how it matures in the Graafian vesicle, escapes from the ovary, is received in the fimbriated extremity of the Fallopian tube, and transferred to the cavity of the uterus.

He is also familiar with the anatomy of the unfecundated ovum, which consists of the vitelline membrane, or *zona pellucida*, or transparent zone, the *vitellius* or *yolk*, the *germinal vesicle* and *germinal spot*, in which there has never been known to exist any change whatever, while it remained in the Graafian vesicle.

In the last article it was shown that it was necessary for the *semen masculinum* to come in contact with the ovum, in order to effect fecundation in the latter body. And that the said contact resulted

in a change of molecular motion in the ovum, which change constitutes the rudimental elements of the embryo, or the life-germ of the new being.

Before the ovum, that has become fecundated, arrives at the middle of the Fallopian tube, in its descent to the uterine cavity, it undergoes such a remarkable change that, from its constituent parts, it would not be recognized as the same body. Some of these, as the germinal vesicle and germinal spot, will be found to have entirely disappeared, and the vitellus to have undergone a very decided modification. These changes and modifications, have been studied under the microscope, as well as the succeeding ones, by Barry, Bischoff, M. Coste, and others, in different animals, as guinea pigs, rabbits, bitches,* etc., and the changes marked day by day, and hour by hour, until the most perfect knowledge of the interesting process of primitive gestation has been acquired.

The ovum, fully matured in all its minute constituents, yields to the electric influence of the spermatozoa, like a dissolving farie vanishes at the touch of the magician's wand, and the conviction, that the silent and unseen changes that distinguish its ulterior deviation from the virgin state, are due to a change in its molecules, is irresistible. There is here a space of time, that defies the powers of the microscope to detect the subtle workings in progress, that convert the unfecundated ovum, into a fecundated one. In a very short time, after the contact of the two reproductive principles, the microscope reveals the first modification that has been effected, and that is discernible in the changed ovum; which consists of an absence of the germinal vesicle and the geminal spot, and, secondly, an altered consistency of the vitellus or yolk.

Fig. 34, represents the first appreciable change in the ovum after fecundation. The vitelline membrane, 1, somewhat thickened. The vitellus, 2, without the germinal vesicle and germinal spot, is more concentrated in the centre. This condensation of the yolk

* The human ova, and those of the latter animal, bear so strong a resemblance to each other, both in the unfecundated and fecundated states, that it is presumed, the modifications that both undergo from fecundation are analogous; hence the changes that occur in the human ovum are inferred to be the same as those observed in that of this animal.

leaves a small space within the vitelline membrane, 3, which is occupied by a thin transparent fluid. The condensation continues to advance until the vitellus becomes quite solid, so much so, as to admit of being separated in two or more parts, by means of the points of two needles, or any other fine instrument. (Bischoff.) This change occurs during its passage through the first half of the tube. Until it arrives at this point, the ovum is enveloped in a thick layer of granules, which it drags with it when it escapes from the Graafian vesicle, being a portion of the granular cumulus, or prolixous disk, by which it is surrounded while in the vesicle.

After the ovum reaches the second half of the tube, this granular layer disappears, and one of transparent albumen takes its place. (Fig. 35, 1). In this portion of the tube the thickness of the albuminous layer and the vitelline, 2, membrane increases. Barry and Bischoff have discovered that here, too, the yolk undergoes a still greater change; that the solid mass divides spontaneously into two separate round bodies, 3, 3, and these again subdivide into four, (Fig. 36, 3, 3, 3, 3,) and so on until the whole mass is reduced by repeated divisions and subdivisions, into an infinite number of very minute spheres, which give the vitellus the appearance of a mulberry, from which circumstance it has been called the *mulberry mass*. (Fig. 37, 3.)

FIG. 34.

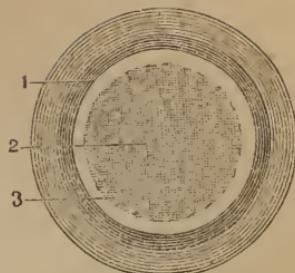
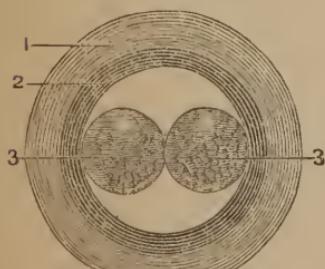
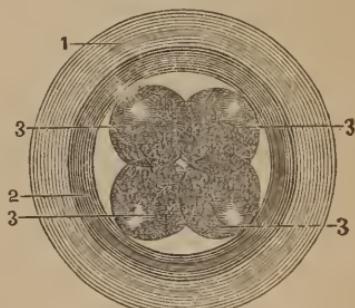


FIG. 35.



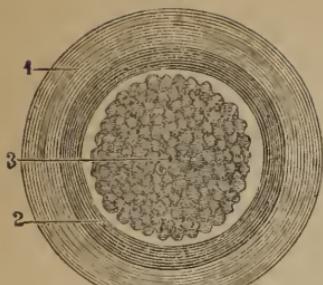
1, ALBUMINOUS LAYER.
2, VITELLINE MEMBRANE.

FIG. 36.



1, ALBUMINOUS LAYER.
2, VITELLINE MEMBRANE.

FIG. 37.

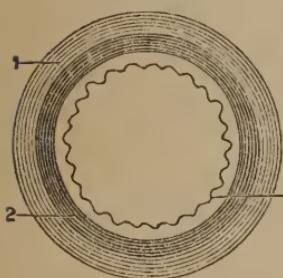


1, ALBUMINOUS LAYER.

1, VITELLINE MEMBRANE.

By the time the ovum arrives in the uterus, the yolk is so far dissolved, that not a vestige of its original character can be discerned. The whole central portion of the mulberry mass has become dissolved, the peripheral particles aggregate themselves together upon the border of the mass, or that portion immediately next to the vitelline membrane, where they are formed into a very thin delicate membrane, enveloping a thin transparent fluid, constituting a *vesicle*, within the vitelline membrane. This Bischoff* denominates the *Blastodermic Vesicle*, and the membrane investing the fluid, the *Blastodermic Membrane*, (Fig. 37, 3,) from $\beta\lambda\alpha\sigma\tau\alpha\nu\omega$, *blastano*, I bud, or I germinate. The germinating membrane.

FIG. 38.



1, ALBUMINOUS LAYER.

2, VITELLINE MEMBRANE.

The albuminous layer that envelopes the ovum and the vitelline membrane, become much diminished in thickness shortly after arriving in the cavity of the uterus.

The student will observe that the first perceptible change effected in the ovum by fecundation, involves the germinal vesicle and germinal spot only; this vesicle and spot, therefore, are the most sensitive parts of the vitellus, the first to receive the impression imparted by the fecundating pro-

perties of the sperm, and having transferred that impression to the rest of the vitelline mass, their mission ends, and they disappear. According to the observations of Barry, Wagner and others, the germinal vesicle is the seat of cell-formation.

The next point worthy of note, is the entire metamorphosis of the yolk, the use of which evidently is, to supply material for the formation of the *blastodermic* or *germinating* membrane, and having accomplished this, like the germinal vesicle and germinal spot, it also disappears. These various and successive changes are necessary to the development of the germinating membrane; and

* According to Todd and Bowman. M. Coste, according to Cazeaux.

as though to economize time, the work is performed during its transit through the tube, and by the time it reaches the cavity of the uterus it is ready for germination.

The blastodermic or germinating membrane is composed of cells formed by the dissolved vitelline mass. Soon after its formation, its thickness is increased by the addition of new cells upon its inner surface, from the remains of the yolk. In this manner is the membrane completed in structure, as the mulberry mass disappears. Immediately after the full formation of the membrane, towards the sixteenth or seventeenth day after fecundation, an opaque roundish spot, consisting of cells and nuclei makes its appearance at some point. It is called by M. Carte the *tache embryonnaire*, or embryonic spot. In this space or "area germinativa," (Fig. 39, 3,) the first traces of the embryo appear, 4, and it is developed upon the surface of the "germinal membrane," and not inside of it, like the chick inside of the shell of the egg. It is covered only by the vitelline membrane. It stands out in relief on the surface of the vesicle. It is ascertained that the blastodermic membrane, as well as the *tache embryonnaire* is composed of two layers, termed the external and internal, which lie in contact with each other.

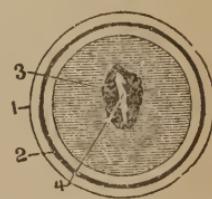
The external layer is serous, and has been denominated the *animal layer*, because the development of the different organs of animal life, as the brain and nervous system has been assigned to it. The internal is mucous, and is called the *vegetative layer*, because the organs of vegetative life, as the alimentary canal have their origin in it.

—Todd and Bowman.

In Fig. 39, we have a front view of the embryonic spot, and in Fig. 40, a side view of the same point is presented. The two layers of the embryonic spot are represented by 2, 3, and the external and internal layer of the blastodermic membrane by 4, 5.

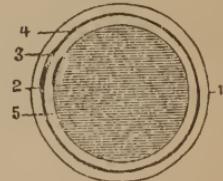
Pending these transformations within the ovum, the albuminous layer surrounding it disappears, and according to Dr. Barry, the vitelline membrane is also removed, leaving the exter-

FIG. 39.



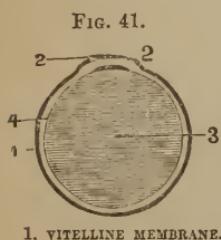
1, VITELLINE MEMBRANE.
2, EXTERNAL LAYER ON THE BLASTODERMIC MEMBRANE.
3, THE EMBRYONIC SPOT.
4, THE PROJECTION OF THE SPOT.

FIG. 40.



1, BLASTODERMIC MEMBRANE.
2, INTERNAL LAYER.
3, THE UMBILICAL VESICLES.
4, THE EMBRYONIC SPOT.
5, THE ALBUMINOUS LAYER.

nal layer of the blastodermic membrane as the only investment of the interior of the ovum. Soon after this the embryonic spot is enlarged and elongated by the addition of formative cells. This is evinced by a swelling out or protrusion of the spot, and leaving a corresponding concavity on the inner surface of the membrane, (Fig. 41, 2, 2.) Here we part with the vitelline membrane, the last

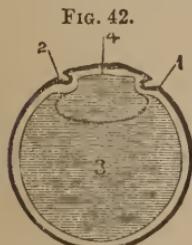


1, VITELLINE MEMBRANE.

vestige of the original ovum. It has been held formerly, that the vitelline membrane constitutes the chorion of the farther advanced ovum, and Todd and Bowman even hold to this impression, notwithstanding the observations of Dr. Barry and others, which prove the contrary. Cazeaux also retains the vitelline membrane in his diagrams, until a much farther advanced state of development of the ovum is attained.

This bulging out of the embryonic spot divides the ovum into two parts, one of which is the embryonic division, and the other, and much the larger, forms the rudiments of the *umbilical vesicle*.

It will be remembered that the more obscure mark in the *area germinativa* or embryonic spot, Fig. 39, constitutes the first traces of the embryo, which are not discernible in the side view, Figs. 40 and 41. From this point the embryo and embryonic portion of the ovum progress in development, and enlarge gradually, while the umbilical vesicle decreases in a corresponding ratio. The external or animal layer of the germinating or blastodermic membrane is now observed to form two folds, one at each extremity of the embryo, the larger of which is called the cephalic, and the smaller the caudal hoods, corresponding to the large and small extremities of the embryo. (Fig. 42, 1.)



3, UMBILICAL VESICLE.

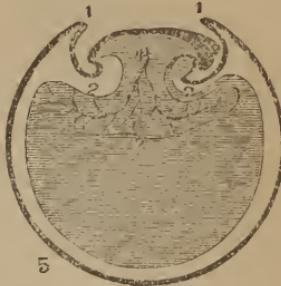
The cephalic; 2, The caudal hoods. These folds increase in all directions, so as to cover the cephalic and caudal extremities of the figure like a cap or hood, hence the term *capuchon céphalique et caudal*, is employed to express the resemblance they bear to a hood for the head. This rudimental

body between the two folds, formed upon, and continuous with the external layer of the blastodermic membrane is the base formation that develops ultimately into the brain and

spinal marrow, while the thickened space between the corresponding folds of the internal layer is ultimately developed into the alimentary canal and abdominal viscera.

As the embryo advances in development, the folds 1, 1, Fig. 43, approach each other nearer and nearer, until they meet; at the same time the hoods, 2, 2, also proximate each other, in every direction, until they envelope the pedicle of the umbilical vesicle, 4, and other structures that constitute the rudiments of the umbilical cord, forming the sheath of the cord, and also the lining of the foetal surface of the placenta, as that organ becomes developed.

FIG. 43.



3, THE UMBILICAL VESICLE.

As the folds of the blastodermic membrane elongate and approach each other, they pass over the dorsal surface of the embryo, and meet, forming a sort of membranous septum, which in a short time becomes absorbed, thus separating the two membranes, at the same time the hoods closing in upon the cord and placenta, form a perfect sack enveloping the embryo. The internal membrane is called the *amnion*, and besides the embryo, it contains a fluid termed the amniotic fluid or liquor amnii. The meeting of the two folds, 1, 1, and the absorption of the septum, leave the external membrane, 5, entire. It is now no longer called the external layer of the blastodermic membrane, but is henceforth known as the *chorion*. In this manner are formed the *chorion* and *amnion*. Until the indefatigable researches of M. Coste, Bischoff, Barry, Wagner and others, demonstrated the process of their development, there was among physiologists an endless contrariety of opinion, in regard to the manner, time, relative precedence, etc., of their formation.

In Fig. 44, it will be observed that the folds, 1, 1, have almost met, and that the hoods, 2, 2, have

FIG. 44.



3, THE UMBILICAL VESICLE.

greatly enlarged, and are approaching each other; with this advancement the two extremities of the embryo, 4, 4, are more inclined inwards, thereby increasing the depth of the cavity between them, which is occupied by a portion of the internal layer of the blastodermic membrane, 5, and which forms a junction with the embryo at a point corresponding with the future neck, thus uniting to

form the alimentary canal. By a

continuous contraction of the folds and a series of progressive developments the abdominal cavity is completed, and its connection with the original blastodermic membrane is maintained only through the medium of the diminished stem of the umbilical vesicle, 6. Now are observed the first rudiments of a circulatory system connected with the embryonic product, and by which it is partly sustained. There are two veins that enter, and one artery that passes from the embryo, called the *omphalo-mesenteric* vessels, (from *ομφαλος*, *omphalos*, navel, and *μεσος*, *mesos*, middle, *εντερον*, *enteron*, intestine). In plain English, then, they are the navel and middle of the intestine vessels.

As the embryo advances in its unfoldings, and the umbilical vesicle diminishes, at a point corresponding to the future bladder, when it and the rectum are yet united in one viscus, under the name of *cloaca*, (from the French *cloaque*, from *cluere*, to purge itself, from *κλυζα*, *kluza*, "I wash,") a pouch at the extremity of the intestinal canal, in which the solid and liquid excretions are commingled in birds, fishes, and reptiles. At this point may be observed emerging from the newly-formed structures a little tubercle, 7, which gradually increases in length and size, forming a little vesicle, which unites with the abdominal cavity by means of a long, slender pedicle. This is the *allantois*, (from *αλλας*, *allas*, a *sausage*, and *ειδος*, *eidos*, shape,) a sort of sausage-shaped bladder situated between the chorion and amnion. M. Coste was first to observe

the allantois in the human ovum, in which its presence was for a long time disputed, though its existence, in the lower mammiferæ was generally conceded by physiologists. Very early in the formation of this body, it is provided with the means of establishing circulation between the embryo and maternal system. The two umbilical arteries and umbilical vein are among its first developments. After-examination shows that the former arise from the primitive iliac arteries, and the latter terminates in the liver.

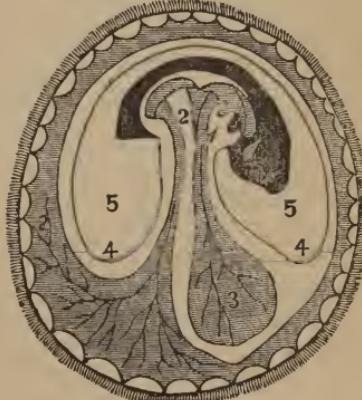
The allantois, 2, 2, 2, (Figs. 45, 46, 47), escape from the abdominal cavity through the umbilicus, in company with the stem of the umbilical vesicle. After it emerges from the umbilicus, its growth and that of its contained vessels are so rapid that it soon mounts up, carrying them with it, until it comes in contact with the inner surface of the chorion, when it commences to expand, and finally spreads out so as to cover the entire or greater part of the inner face of the external membrane. While this is the manner of its disposition in some of the mammiferæ, it has not been found to be the case in the human subject. In woman it is thought probable that the base only comes in contact with the chorion, where it carries the umbilical vessels, to enter into the formation of the placenta (vide Fig. 47).

FIG. 45.



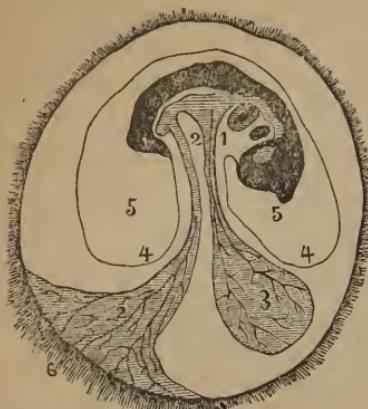
3, UMBILICAL VESICLE.

FIG. 46.



3, UMBILICAL VESICLE.

FIG. 47.



3. UMBILICAL VESICLE.

In Fig. 46, it will be observed that the folds, 4, 4, have met, and the point of union is marked by the presence of a septum, or rather a bridge, 5, formed by the membranous folds coming in contact. This in a short time becomes absorbed, and the hoods, 6, 6, close in upon the stems of the umbilical vesicle, 1, and allantois, 2, forming a sheath for them, which leaves the amnion, 7, 7, a perfect vesicle, contain-

ing the embryo cord and liquor amnii. In Fig. 46 and 47 the hoods are very much enlarged and are about enclosing the stems. The stem of the umbilical vesicle, Fig. 47, is observed to be considerably enlarged, where it is united to the embryo; this is in consequence of its containing a portion of the intestines that have already become developed, and which remain in the umbilical cord until towards the third month of embryonic existence. The septum between the folds, as seen in Fig. 45, 5, has disappeared, and the amnion, 5, 5, is seen within the chorion, entire with the umbilical vesicle, 3, and the allantois, 2, between it and the chorion. In Figs. 45 and 46 the allantois, 2, 2, spreads out in the first instance, covering a part, and in the second the entire internal surface of the chorion, while in Fig. 47, it (2) extends to the chorion, with which its contact is limited to a small space. The umbilical vessels are carried by it to the chorion to assist in forming the rudiments of the placenta. This figure is designed to represent the human ovum, and the other two those of the lower mammiferæ.

About the twentieth day after fecundation the external surface of the chorion begins to be covered with villi (Figs. 45, 46, 47). At that portion of it where the allantois is attached they are more numerous and of a larger growth (Fig. 47, 6). These intermingle with those of the mucous membrane lining the uterus, and commence the formation of the placenta.

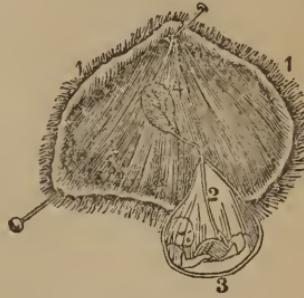
The student has now pursued the path of the ovum's unfolding, from the moment it was first touched by the energizing power of fecundation, step by step, until he has arrived at its point of completion, (Fig. 48,) viz.: the development of the chorion, amnion, embryo, the rudiments of the funis umbilicalis, placenta, and liquor amnii. His attention is now directed to the further development of the embryo, especially Fig. 48.

FIG. 48.



RAMSEOTHAM, FIG. 52, PLATE XV.

FIG. 49.



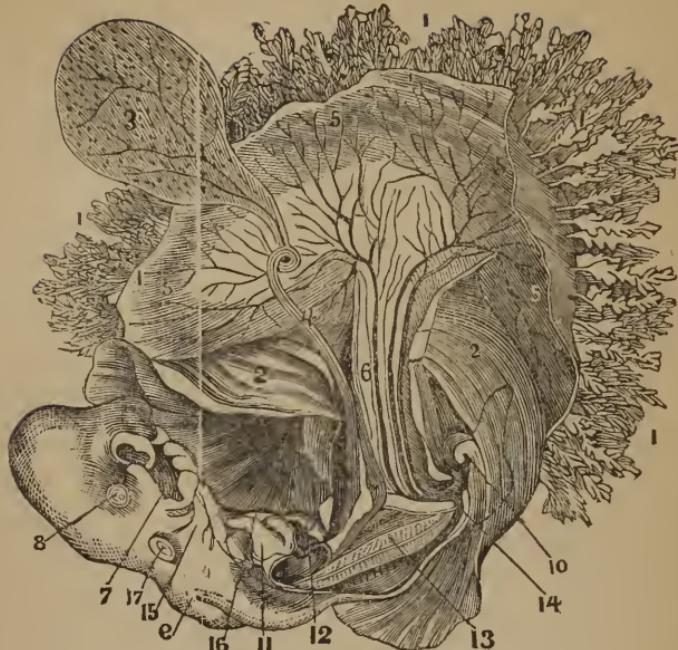
CAZEAX, PLATE I.

Fig. 48: The human ovum, near its natural size, about the fortieth day, covered with its villi. Fig. 49: The same ovum, laid open to show its constituent parts: 1, 1, the chorion; 2, the amnios; 3, the foetus shown through the amnios; 4, the umbilical vesicle.

Fig. 50 represents the same ovum, much magnified and the amnios opened 1, 1, 1; 2, 2, the amnios closing in on the rudiments of the cord to form its sheath; 3, the umbilical vesicle, with the branches of the omphales, mesenteric vessels; ramifying through it; 4, the stem of the umbilical vesicle; 5, 5, 5, the ramifications of the umbilical vessels through the allantois, over that part of the chorion that forms the placenta; 6, the umbilical vessels that constitute the stem of the allantois; 7, the bronchial fissures; 8, the rudiments of the eye; 9, rudiments of superior extremities; 10, rudiments of inferior extremities; 11, the heart; 12, the lungs; 13, the corpora Wolfiana; 14, the cloaca; 15, transverse fissures; 17, the external ear.

The human embryo between the third and fourth weeks of gestation is an oblong, curved body, vermiciform in shape, rather pointed at one extremity and blunt at the other, and from two to

FIG. 50.



TODD AND BOWMAN. FIG. 283, PAGE 873.

four lines in length. It is smooth, nearly transparent, and of a grayish color. There are no marks of extremities apparent; neither is the head distinguishable from other parts of the body, except by the bluntness of one of its extremities, encircled with slight depression. In the larger extremity the anterior cerebral vesicles are said to be well marked, and immediately behind them are the very large corpora quadrigemina. The position of the ophthalmic and auditory vesicles are indicated.

Three or four visceral arches are seen with the branchial fissures between them (Fig. 50). The heart is not yet fully formed. It weighs about two grains.

About the fifth week, there are three branchial fissures and arches behind the lower jaw. The divisions of the vertebræ are very distinctly marked, and in consequence of the curvature of the embryo, the coccyx and forehead are brought very close together. It by this time acquires a greater consistency. The increase of the head is very great in proportion to other parts of

the body; the rudiments of the eyes are represented by two small black spots, one upon each side of the median line of the head, 8. The origin of the upper extremities is presented in two little prominences, or projecting points, one upon each side just below the neck, 9. Two similar points are visible, projecting from the caudal extremity, one on each side of the median line, which indicate the origin of the lower extremities, 10. It is from six to eight lines in length, and weighs about fifteen grains.

The heart is now plainly discernible, and bears a fair resemblance to that of adult life, 11. Inter-auricular and inter-ventricular fissures, that subsequently form the septa between the auricles and ventricles, are observable; but one ventricle is, however, present, and it gives origin to both the aorta and pulmonary arteries. There is but one auricle, or at least the septum that separates them is so imperfectly developed that it amounts to but one. This partition maintains an opening during the whole of foetal life, which is termed the foramen ovale, or the foramen of Botal, which closes and renders the septum complete at birth. It is averred, however, from observation, that the foramen of Botal is not always obliterated at birth, but continues even until the approach of adult life.—*Dr. R. P. Thomas.*

The lungs, when first seen, consist of two small masses of cells, at the lower part of the œsophagus, 12. These masses gradually augment in size, leaving a cavity within. At the upper part they unite to form the *trachea*. At this period of their development, the respiratory organs consist of vesicles, attached to the lower part of the trachea. About the fifth or sixth week they are constituted of five or six lobes in which we can readily distinguish the bronchial extremities, terminating in some slightly swollen cul-de-sacs.

The *Corpora Wolffiana*, or the Wolffian bodies. About this time are developed two small glands, situated upon each side of the spine, extending upwards as far as the lungs, 13. They lie in front of the kidneys and supra-renal capsules, and are called the Wolffian bodies. Each one has an excretory duct which opens into cloaca or sinus-genitalis, whence its contents pass into the allantois, 14. These bodies are to be regarded in the light of temporary kidneys, the functions of which they anticipate until the lat-

ter are fully developed, for which reason they have been denominated the *false kidneys*.

They disappear as soon as the true organs are prepared to take their place, leaving no trace that they have ever existed. A second excretory duct is observed alongside of the one described, in each Wolffian body, that extends its whole length, and also empties into the cloaca; but has no connection, whatever, with the first. This is said to form the Fallopian tube or vas deferens, as the embryo shall prove to be either male or female.

"In the early stages of embryonic life, there is likewise, on each side of the neck, in the human foetus (as also in the mammiferæ) four transverse fissures, which open into the pharynx, 15. These are separated from one another by certain bands, or flesh partitions, that correspond with the bronchial arcs (gills) of fishes; for the vascular apparatus distributed these effects, to a certain extent, the same form temporarily, that it has permanently, in the inferior vertebratæ. We, therefore, see that the bulb of the aorta, instead of curving immediately into a single arch, divides, on the contrary, into three or four branches on each side of the neck, 16; and, after these branches have each accompanied a bronchial arch, they re-unite at a common point, to form the descending aorta; however they are soon effaced along with the corresponding fissures, and but two remain on the left side, one of which is converted into the *arcus aortæ*, while the other, after having existed as an arterial canal, will form the common trunk of the pulmonary arteries.

The branchial fissures, just under consideration, also disappear, with the exception of a single one (the first on each side) which is converted into the external ear," 17.—*Cazeaux*.

Towards the end of the second month, ossification commences in the lower jaw and clavicle. The development of the kidneys, ovaries, testes, and external generative organs commences, but the sexes are not distinguishable from these until a later period, as the clitoris and penis bear so near a resemblance to each other, both in size and position that they cannot be distinguished, and the labia and scrotum are not sufficiently defined to render any aid in making the distinction. The bladder is formed somewhat later by a separation of a portion of the *urachus*, a narrow tube,

which is all that remains of the allantois. The cavities of the mouth and nose are not yet separate; the upper jaw is separate vertically, and consists of two papulae, one for each side, which, gradually, by the process of growth, approach each other at the median line, and then unite in a single body. The nostrils are similarly separated; they gradually proximate each other and assume their definite form. Where the upper jaw and the nostrils fail to effect a vertical union, as is sometimes the case, we have what is called the cleft jaw and hare-lip.

The intestine is still retained in the umbilical cord, which is about five lines long. The anus remains closed. The Wolfian bodies alone remain near the vertebral column, but much contracted. The rudimentary extremities are more prolonged, the fore-arm, with a flattened extremity for a hand, but without fingers, is observable, so also are the leg and foot without toes, the arm and thigh are yet absent. The cord is inserted in the abdomen, within two or three lines of its lower border, between which and the coccyx may be seen a small tubercle, which represents the undeveloped external genitals.

The eyes have a degree of prominence, but the eye-balls are not supplied with lids to cover them. The nose presents a perceptible elevation, two round separate openings indicate the nostrils. From the undeveloped state of the lips the mouth appears open; it is said that the epidermis can be distinguished from the true skin at this time; but the latter has no real existence until a pretty advanced period of the growth of the embryo; it is nothing more than a homogeneous gelatinous substance, of slight consistency. The embryo is about fifteen or twenty lines in length, and weighs from three to five drachms, the head forming a great part of the whole.

At three months the teguments are distinct, but still partially gelatinous and of a rose color. The eyes and mouth are now furnished with lids and lips and are closed; the nose is more decidedly projecting, the head is very large, but bears a better proportion to the body than heretofore; the costal arches and bones of the forearm are visible through the transparent substance that encloses them; the fingers and toes are perfectly distinct, and coursed on the dorsal surface of their extremities with a reddish

plate, which possesses the shape of the nail. In fact, all the organs have now a definite origin, and they become amenable to the laws of growth instead of development. The twisted arrangement of the cord is now apparent. At the end of the third month the name of embryo ceases, and that of foetus is introduced. The length of the foetus from vertex to coccyx is three inches, and its weight about three ounces.

At *four months* the derm has a much firmer texture, and is furnished here and there with fatty granules beneath it. The head presents a thin coat of fine downy hair. Now the sex may be distinguished by the advanced state of the genitals, the scrotum or labia as the case may be; the anus is no longer imperforate; the lower extremities are as long as the upper. Ossification is much further advanced; but from its imperfect condition, the fontanells and sutures are very large. From the further development of the lower abdomen the cord appears to be inserted higher up than formerly, and nearer the centre of the body. At four months and a half is the time of quickening, or of the first perceptible foetal motion. The body is four or six inches in length, and its weight is six or seven ounces. If the measurement and weight at this time be compared with those at the end of the third month, it will be seen that the growth of the present month has been equal to, or exceeded, that of the three previous months. The reason of this is, the forces that were exercised in effecting the *development* of the various organs of the *embryo*, are now excited in promoting the *growth* of the *fœtus*.

At *five months* the skin is more consistent and less transparent, but it still retains its roseate hue; it possesses some strength, being slightly extensible; a little down, and patches of sebaceous matter are observable on the derm. The rudimentary nails are visible, and the distance between the insertion of the cord and the pubis is still greater than previously. The pupil is yet undistinguishable. The length of the body is eight or nine inches, and weight from eight to ten ounces.

At *six months*, which is the period of legal viability, when a fœtus born may live, it is distinguished by an increased growth, above all previous periods. All the structures and tissues are in a greatly advanced state. The hair upon the head is more plen-

tiful and longer. The eyelids are thicker and no longer transparent, they are closed upon the eye-balls, and their edges, as well as the brows, present rows of thin fine hairs. The pupils, according to Velpeau, Cazeaux, and our own observations, are very large, occupying nearly the entire iris, which fact, earlier observers mistook for their total absence. This accounts for the statement of authors that no pupil exists at this period. The nails are quite firm. The skin is more perfectly formed, and the hairs and sebaceous matter upon it are more abundant. The scrotum is small and red. The lower extremity of the sternum or ensiform cartilage is said to represent the middle of the length of the body, which is from nine to eleven inches, and its weight from one and a half to two pounds (*avoir*).

At *seven months* the foetus is remarkable for a still greater degree of maturity in all its parts. The hair upon the head is longer, and begins to assume a definite color; the skin is much firmer, more extensible and covered more abundantly with fine hair and sebaceous matter; the nails are larger and still more solid. The under jaw, which was hitherto very short, in comparison with the upper one, has now projected almost even with it. All the features of the face are much more regular and their proportions better defined. The body and limbs are much rounder and plumper, in consequence of a greater deposit of fatty matter in the subcutaneous cellular tissue. The insertion of the cord appears to have receded still further from the pubis. The *membrane pupillaris*, which authors say bursts at this period, and allows the pupil to become visible, Velpeau regards rather as a hypothesis than a reality. He says: "I have reason to think the iris originates at first as a simple ring, which grows concentrically, so as at least to leave an opening commonly called pupil or apple of the eye." Births occurring at this period, and between this and term, are denominated premature labors, while those occurring antecedently to this are designated abortions. A child born at this period has about an equal chance for life or death—many live, many die. The length of the body is from ten to twelve inches, and weight from two and a half to four pounds.

At *eight months* the foetus is still further matured; the skin firmer and more resisting; the rose color is changed to a deeper

red, the down longer, and the sebaceous matter, *cutaneous induitans*, more generally extended over the surface; sometimes it is confined mainly to the head, back, arm-pits and groins, and occasionally it is only met with in the two latter localities. Desormeaux was the first, perhaps, to notice the fact, that the growth is now greater in regard to its thickness than length, as the disproportion between its length and weight is greater than at any previous period. One testicle has descended into the scrotum; generally the left. Its length is from twelve to fourteen inches, and its weight from four to five pounds.

An impression has gained admission into many unprofessional minds, that children born at this period are less likely to live than those born at seven months; this notion is unsustained by reason or facts. All children born prematurely are less likely to live than those who have remained in utero their allotted time; but the nearer they approach the full time the more liable they are to survive; because they are more fully matured, stronger, and better able to endure the vicissitudes of an independent existence. And this is just in proportion as the birth approaches the full term. *Some* live at six months, more at seven, still more, in proportion to the number of births at that period, at eight, and most of all at nine.

At *nine months*, the *full term of gestation*, the work of generation is accomplished, and the last act in the process of reproduction consummated. At this time the foetus has arrived at the acme of intro-uterine maturity, and by a bounteous provision is transferred from the uterine cavity to the outer world. It now takes the name of child; and to become acquainted with the extremes and medial proportions of its dimensions and weight is a matter of no trifling importance, in view of the position the physician is liable to be called upon to occupy, as a medical witness or an expert, in courts of justice, before inquests, etc., where professional opinions are taken in evidence upon trials involving the reputation or perhaps the life of the accused; and also to enable him to give an intelligent opinion, when required, in other than a legal capacity.

While amongst adults enormous dimensions and great weight are allotted to some, extreme diminutiveness and scanty weight

are the award of others, and it is extremely difficult to find two persons of exactly the same size and weight; but many are met with in which there are a few inches difference in their size and but a few ounces difference in their weight. These are called medium-sized people, though no two of them may measure or weigh exactly alike. Now the same difference exists in regard to new-born infants; no exact standard, therefore, can be given, of what constitutes a healthy, well-formed and fully-developed child at its birth at full term. Such a medium scale of weights and measures then must be adopted as can be sustained by the greatest number of actual observations, making due allowance for trifling deviations. The average length of children at birth, well formed and healthy, from vertex to heels, in the United States, is from eighteen to twenty-two inches, and the average weight of such is from seven to eight pounds.

In France, according to Velpeau, the average length is eighteen inches, the weight is generally six pounds, frequently six and a half or seven, sometimes eight, and rarely nine or ten pounds. According to Cazeaux, the length is from nineteen to twenty-three inches, and the weight from six to seven pounds. By comparing the children of the United States with those of France, it will be observed that the former weigh more in proportion to their length than the latter, and that the average weight of the former is greater than that of the latter.

In Germany the average weight is between seven and eight pounds. In Great Britain and Ireland the average length is nineteen or twenty inches, and weight from five to eight pounds.

It is uniformly the case in all countries, that the average size of male infants is a few fractions of an inch greater than that of the females, and that the weight of the former exceed that of the latter by a few ounces. Twelve males weigh as much as thirteen females. Dr. Dewees gives the measurements of a male child that was born under his charge, the weight of which he was not allowed to get, on account of the prejudices of the parents; many persons think it "bad luck" to have a child weighed.

"Round the forehead and vertex . . . 16 and 4-8 inches,
Round the shoulders 19 and 5-8 inches,
Round the arm below the elbow . . . 5 and 6-8 inches."

It is to be regretted that the length of this boy is not given.

The same author states that he delivered a woman of a male child that weighed, without clothes, fifteen pounds and a half, and that he delivered the same woman twice subsequently of male children; though he did not weigh them, from their size he estimated their weight, each, at nothing less. He further says: "I have met with two ascertained cases of fifteen pounds, and several I believed to be of equal weight." Dr. Meiggs says: "I have weighed many at eleven and a half pounds, and several at twelve pounds. A few years since a lady in this city gave birth to a child of thirteen and a half pounds, carefully weighed by me. She died a few days afterwards with puerperal fever. I have already noted a case of twins the sum of whose weight was sixteen and a half pounds."

Dr. Henry H. Munson, writing from Oswego, Pa., says: "Out of forty-three cases that came under my observation during the year 1866, eleven weighed ten pounds and over; the largest weighing twelve pounds nine ounces. Of the forty-six nearly twenty-five per cent. weighed over ten pounds. The delivery of two of these was assisted by the forceps, one of which was still-born, the other lived. The remaining nine were living children. The mothers of these children were rather above the medium size and healthy, as is the case with women generally in this mountain country."

Dr. Moore, of New York, states that in 1821, a child was born in that city, that weighed sixteen pounds and a half.—*Ramsbotham.**

We attended a lady in the northern environs of the city some eight years ago, who gave birth to twins, one a male, the other a female; the former measured eighteen inches from vertex to heels, was large in proportion, and weighed eight pounds and a half; the latter measured sixteen and a half inches, was well proportioned, and weighed seven pounds and three-quarters. They are both living, and are remarkably fine, large, healthy children. It was her second confinement; she has given birth to one child since. The twins were each as large as either of the single children. Within two years we attended a lady with her first child, a male; it perished from a premature descent of the cord, which was forty-

* *New York Med. and Phys. Journal*, Vol. ii., p. 20.

eight inches long, the child measured *twenty-four inches*, and was delivered with the forceps; it was not well proportioned, being rather spare; its weight was estimated at about eight pounds, though it was not weighed. The mother had convulsions, and was very much exhausted, but finally recovered her usual health. Now as the average length of the new born child, in this country, is from eighteen to twenty-two inches, and its average weight from seven to eight pounds, and as these averages are frequently exceeded by several inches, and by several pounds, from excessive development, so also may they be diminished to a like extent, from retarded or defective development, and it has been observed by every experienced obstetrician, that children are often born at term, whose length does not exceed ten or twelve inches, and whose weight is limited to four or five pounds.

In France, where the average weight is less than in the United States or England, of fifteen hundred and forty-four cases examined by Camus, the greatest weight was nine pounds, and there were but sixteen instances of this. The average weight was six and a quarter. There were thirty-one children that weighed but three pounds each.

Among the four thousand children, born at the Maternité at Paris, in a given time, Madame La Chappell never met with one weighing as much as twelve pounds. Baudelocque, who had a case where the child weighed twelve pounds and three quarters, maintained that it is incredible that a larger one was ever seen.

The largest child of the three thousand, born under the charge of Cazeaux, either in the Hôtel Dieu, or at la Clinique, weighed ten pounds, and says he, "it was enormous; further, I do not remember ever having seen one longer than twenty-two inches."

Chaussier has given the following as the proportions exhibited by the different parts of the foetus at birth (taken from a child 19½ inches long) namely:

From the apex of the head to the pubis,	12½ in.
" the pubis to the feet,	7½ "
" the clavicle to the bottom of the sternum,	2 "
" the latter to the pubis,	6½ "

The *transverse* measurement he found as follows:—

From the top of one shoulder to the other (bis-acronial, or transverse diameter of the thorax),	4¾ in.
" the sternum to the spine (antero-posterior diameter), 3½ "	

From ileum to ileum (transverse diameter of the pelvis), . . 3 in.
 " one femoral tuberosity to the other, $3\frac{1}{2}$ "

There is no doubt but that this is given as a sample of extraordinary development of a young Frenchman, and may be regarded as an extreme case.

*The other extreme, according to Chaussier, is as follows, in weight, five, four, and sometimes three or two and a half pounds.

In England and Ireland, according to Rigby and others, the average weight is between six and seven pounds. Ramsbotham, nearly seven pounds.

In excess of this, Dr. Merriman delivered one, still born, of fourteen pounds. Sir Richard Croft delivered one, alive, of fifteen pounds. Mr. J. D. Owens, Surgeon, at Haymoor, near Ludlow, delivered one, dead born, of seventeen pounds twelve ounces, and measured as follows:—

The long diameter from the occipital to the root of the nose,	$7\frac{1}{4}$	in.
The occipito-mental,	$8\frac{1}{2}$	"
From one parietal protuberance to the other,	5	"
Circumference of skull,	$15\frac{1}{4}$	"
Circumference of thorax over the xiphoid cartilage,	$14\frac{1}{2}$	"
Breadth of the shoulders,	$7\frac{1}{4}$	"
Extreme length of the child,	24	"

Dr. Clark, of Dublin, estimates the lowest extreme in that country at four pounds.

Dr. Dewees says: "From what has been said, it must be certain that the foetus, like every other product, will be liable to a variety of contingencies in its progress from the germinal to the fully expanded state, and, consequently, that the laws of development may be imperfectly or irregularly, too slowly or too rapidly performed, which will, as one or other of these conditions prevails, give rise to a considerable difference in the appearance of the newly-born child."

"If the laws of development be imperfectly or irregularly performed, the foetus may be defective in some of its parts; or it may be natural or excessive in other portions of its body. If too slowly developed, it will exhibit marks of immaturity, but

* Rigby, *Lancet*, Dec. 22, 1838.

not (perhaps necessarily) of imperfection. If this be too rapidly performed, there will be evidence of it in the excessive though perfect size of all its members. In a medico-legal point of view, it is of great consequence, sometimes, to decide between immaturity of development, and the imperfection of the development of the foetus; the first has relation to the time it may have tarried in the uterus, while the second is dependent upon the manner in which development has proceeded, or has been performed *in utero*. These two conditions of the foetus, it will be easily perceived, may have a very important influence in certain cases, as one or the other may exist. On the other hand, when development is performed too rapidly or excessively, it may give rise to very important consequences."

"Instances of the retardment of foetal development are by no means uncommon; but when this occurs it may occasion much error of deduction; especially when the deduction is based upon the mere appearance of the child. In some instances it may involve the happiness and character of the individuals with whom this deficiency of organic power may prevail; it therefore merits serious attention. On the other hand, causes may operate to hasten, or rather to augment development; so much so is this the case sometimes, as also to lead to conclusions equally disastrous to the reputation and happiness of the individuals concerned, in the event of its becoming a medico-legal question."

Dr. Dewees proceeds to give the details of two cases, one in which development was retarded or defective, and the other where it was too rapid or in excess. The first is related in the "*Clinique d'Accouchemens de Paris*," and reported by Dr. Lovate in the *Révue Medicale*, Vol. III. This is a case recorded as an instance of abortion at five months, though the woman believed herself to be at term. The reporter avers, that "every appearance announced the opinion of the woman to be correct; this was her sixth pregnancy, and she had been, previously to impregnation, perfectly regular in her catamenial discharges. Eight menstrual periods had passed; the abdomen swelled progressively, and regularly; the child was felt for several months; the neck of the uterus was very short, and the lower segment of the uterine cavity was much developed; the head of the foetus was easily felt, but was

very movable. The uterus reached to the epigastric region, and the abdomen was very voluminous. On the 28th November, 1824, this woman was delivered naturally of a living, but feeble, and what appeared to be not more than a five months child; it lived some hours; it weighed two pounds ten ounces; it measured thirteen inches and nine lines, and there was great disproportion in length between the inferior and superior parts, from about the umbilicus. The waters weighed more than ten pounds, and escaped with the dependencies of the foetus. This extraordinary accumulation of the liquor amnii, is considered the cause of the error of the period of gestation, and of the early birth of the child."

Our author says of this case: "that the history of it appears to afford the strongest grounds for the belief, that the woman went her full time; and that the under size and weight of the child was owing to its incomplete development." And after giving his reasons in full, in a protracted review of the case, for this opinion he further remarks: "As regards ourselves, we have no hesitation to believe this case to be one of retarded, or imperfect development of the foetus, and that its application to medico-legal investigations may be highly important."* Every experienced accoucheur could give his own observations in support of this belief, as these cases of retarded development, though by no means frequent, occur sufficiently often to arrest the attention of the observing practitioner.

The second case, that of rapid or excessive development, came under his own observation, and is enhanced in interest, on account of a suit, for a divorce, that was contemplated to be instituted in consequence of it. In November, 1810, the Doctor states, he was called to attend a patient in labor with her first child. Upon making an examination he discovered that the neck of the uterus had not become entirely obliterated, as a portion of it could be felt. She had been suddenly attacked with violent pain, in consequence, as was supposed, of some great mental disturbance. Upon making inquiry, in regard to her time being out, she informed him that she was but seven months gone.

After several hours of severe suffering she was delivered of a

* Dewees' System of Midwifery, Fourth Edition, page 295, par. 230-235.

very large boy, or very large for a seven months child. As he was an entire stranger to the parties, he made no observations upon the case at the time, though its size, solicited from an old lady, present, *the mother of the husband*, the remark that "it was the finest seven months child she had ever seen." It was certain that the child bore every mark of greater maturity than is usual for one born at seven months of utero-gestation.

Several months afterwards he was called upon, and examined before a magistrate, in the presence of two lawyers, as preliminary to a suit for divorce, which was intended by the husband, to be sued for, provided his opinions of the case should be considered favorable to such an undertaking.

The allegations upon which the divorce was to be prayed for, were as follows: 1. The wife had been delivered of a child seven months after her marriage. 2. The husband had been absent from the country for several months, and had been at home but two days previous to marriage. 3. That she had been delivered at seven months after marriage, of a full grown child, (which weighed between six and seven pounds). Hence it was declared, that the wife was pregnant before marriage, and not by her husband.

On behalf of the defendant, it was proved that she had sustained an irreproachable character; that she was an industrious, domestic woman; that she had not received the visits of, nor been intimate with, any man in particular; that she had during the whole time lived with the mother of the husband; and that she had menstruated but a few days before her marriage. The doctor testified that the cervix uteri was somewhat more developed than was usual at seven months, but it was not effaced; this fact gave rise to the inquiry of her, in regard to her time, which drew forth the answer that she was but seven months gone; and that his opinion and belief was that she was not in error in regard to her calculation, though the child was much larger than usual at that period; that violent mental excitement was a frequent cause of abortion and of premature delivery; and that it had been found that this woman had been violently excited and very angry the day before she experienced any labor pains, and that

her mental disturbance might have occasioned the premature delivery.

After explaining, before the magistrate, that the average weight of a new-born child, at term, in this country, is between seven and eight pounds, and that for it to be above or below that standard is by no means uncommon. That a child which would weigh twelve or fourteen pounds at full term, would most probably weigh half that amount at seven months, and that there could be no possible reason assigned why this might not have occurred in the case in question. The husband was so entirely satisfied with the possibility that such might be the case, in this instance, that he abandoned the intended prosecution, and no doubt made the *amende honorable*, for the injury he had inflicted upon an innocent wife, and a virtuous woman.

This case shows the necessity of the medical witness taking *all* the facts into consideration, in making up a conclusion in reference to a case, especially where important consequences are involved. Had the witness here confined himself to the weight and size of the child, and taken no note of the condition of the cervix uteri, etc., innocence would fail to have been vindicated, and wrong and injustice would have triumphed.

The following is perhaps the most remarkable instance of divergence from the average weight of the new-born infant at term, occurring in the children of the same woman, that has ever been recorded :

On the 19th of January, 1848, we were called to attend Mrs. Rebecca LaRue, in labor with her third child. She was not quite as large as usual at term ; this fact led to an inquiry, as to her being at her full term ; she stated that her time was fully up. In due time, after a labor of greater severity than is often experienced at full term, when the child is three times the size of this, during which an enormous quantity of liquor amnii escaped, a male child was born, of most diminutive dimensions. There not being present the means of weighing it, its weight was estimated at two pounds. Its size and weight did not exceed that of an ordinary foetus of six months. The clothes that had been prepared for it were all so large that they could not be worn ; the doll, one of medium size, belonging to a neighbor's little girl, was

stripped, and the baby was dressed in its clothes. That child at this date, January, 1867, is in his nineteenth year, is about four feet high, and weighs sixty-one pounds.

On the 18th of May, 1851, she was delivered of a live male child, under the care of another physician, who weighed it; its weight was fifteen pounds. This we have from the lips of the lady herself, for whose veracity we are free to vouch.

The lady when married weighed eighty-four and a quarter pounds, she is now in her fifty-first year, and after giving birth to thirteen children, ten boys and three girls, weighs one hundred and twenty pounds.

Perhaps there is no subject in the whole range of medical science, that is more intimately connected with jurisprudence, or one in which the physician is more frequently called upon to testify, than that of embryology, in all its multiform applications to law in relation to marriage, legitimacy, abortions, infanticide, etc. And it is with a view of calling the attention of the student to, and enlisting an interest in, this branch of medical jurisprudence that so much time and space have been devoted to the present article. There can be nothing more humiliating to the individual, nor anything better calculated to impair public confidence in the profession, or detract from its real value, than for one of its authorized members to be found ignorant in regard to its most important and interesting bearing upon the happiness, reputation and perhaps life of any member or members of the community. And it behooves every student to be prepared, at all times, to take the stand in vindication of right and justice, upon purely scientific grounds, whenever called upon by the properly-constituted authorities so to do. If this were the case there would be less contradiction and discrepancy in medical testimony, than is at present unfortunately the case; and the community would have much more confidence in that kind of testimony than is now awarded it.

PART FOURTH.

CHAPTER I.

OF PREGNANCY.

PREGNANCY is distinguished into 1, natural or uterine pregnancy; which is divided into simple, compound, complicated and false pregnancies.

2. Preternatural, or extra-uterine, which consists of the fecundated ovum forming an attachment to structures outside the uterus: as the ovary, and is called ovarian pregnancy; the cavity of the Fallopian tube, and is called tubal pregnancy; the peritoneal lining of the abdomen, and is denominated abdominal pregnancy.

3. Interstitial pregnancy, where the ovum forms an attachment in the interstices of the substances of the uterus.

Utero-gestation, a term synonymous with natural or uterine pregnancy, is often used in its stead, and signifies the state or condition of a female, who bears in her *uterus* the product of conception, whether it consists of one or more ova, and continues from the moment of conception, until its product shall have been expelled by its own contractile powers. The natural period of pregnancy is forty weeks, or ten menstrual periods, or two hundred and eighty days. When the ovum is lodged in the cavity of the uterus, and is retained there, it is called *true* or *normal* pregnancy. When it forms its attachment outside of the uterine cavity it is termed *bad*, *extraordinary*, or *abnormal* pregnancy.

Simple pregnancy, is where a single ovum, after fecundation, is deposited and developed in the cavity of the uterus.

Compound pregnancy, is where two or more ova are contained in the uterine cavity.

Complicated pregnancy, is where one or more foetuses and some extraordinary growth, as one or more moles or hydatids or intra-uterine tumors, are contained and developed together within the uterus.

False pregnancy, is where gestation has been interfered with, and where the product of conception had degenerated into an amorphous or vesicular mass, as a mole or moles, or hydatids.

CHAPTER II.

NATURAL OR UTERINE PREGNANCY, AND ITS DURATION.

NOTWITHSTANDING, as has been observed, the natural duration of pregnancy is forty weeks, or two hundred and eighty days, there is often a great divergence from this time, and we are indebted to the investigations of Dr. Charles F. Buckingham, of Boston, for the following interesting data, which we extract from the "*Boston Medical and Surgical Journal*," of March 12, 1868. It is the latest statistics we have upon the subject, and, moreover, it is *American*, which enhances its value with the American student:

The duration of pregnancy is a point upon which we are often called to give an opinion. For many years I have tried to find from my patients such facts as would enable me to form some table which might be of value to myself and the profession. Of late years, more of them have been of a class who are willing to trouble themselves, by keeping records of the days on which their monthly periods began. The result I send to you in the form of tables, with only a few comments, leaving those professional brethren who are interested in such matters to draw their own inferences, and compare their experience with mine. I should say

that every case has been rejected where I have found the slightest chance to hang a doubt upon it.

The first table gives the number of days from the first day of the last menstruation, and in that table the particular labor, whether first or otherwise, is noted. The second table is simply a statement of the weeks after the commencement of the last periods in which the different labors took place.

There is an opinion prevalent among women that first pregnancies are shorter than subsequent ones, and the mischievous say that they are no shorter, unless marriage takes place too late. The longest case but two of which I have the record was a first pregnancy, and the shortest, not known to be the result of violence, and in which the child lived, was also a first or a fifth pregnancy.

The third table will show that, in my own practice, up to the completion of the fourth pregnancy, a decided majority (over fifty-seven per cent.) carried their children ten lunar months or more. After the third (3d) pregnancy, fifty-six per cent. were confined before the ten lunar months expired, and after the fourth (4th) over sixty-nine per cent.

Of course, the record of so few cases is not enough to establish any rule, but collections of cases by fair observers, who will publish them, will help some professional statistician in his observations.

One of the curiosities of the collection is the patient who went three hundred and thirty (330) days, and who acknowledged having been several times operated upon for the purpose of procuring abortion, and having been constant in the taking of medicines for the same purpose.

I afterwards found that this woman had invariably tried to produce abortion in every pregnancy. She has been confined, I think, twelve (12) times in all, but has had only four (4) living children. She has seldom gone over seven (7) months, and her husband professed to know nothing of any attempt to procure abortion. I am satisfied from her own statements, however, that except perhaps in two (2) instances, there has always been some endeavor, by drugs or instrumental interference, to put an end to pregnancy. In two cases in which it was attempted it failed, and in one of the labors she was attended by the operator, who, as is

usual in such cases, performed his operation on the condition that he should not be called upon to attend the case. This child was also living.

Of all the patients, only fifteen (15) were confined on the two hundred and eightieth day, two (2) only of these being first labors.

One pair of twins (a fifth labor) was born on the two hundred and thirtieth (230th) day; one pair on the two hundred and forty-seventh (247th), a sixth labor; one pair on the two hundred and seventy-sixth (276th), a second labor; one pair on the two hundred and seventy-eighth (278th), a fifth labor; and one pair on the two hundred and eightieth (280th), a second labor.

A question has risen, which only long observation can answer—how much has a constantly irregular period of menstruation to do with the duration of labor? I think that a very large minority of women menstruate upon another than the twenty-eighth day. Certainly a large minority are irregular; and many have some other regular period, like twenty-one, or thirty, or even more days.

TABLE I.

No. of days from beginning of last catamenial flow.	1st Labor.	2d Labor.	3d Labor.	4th Labor.	5th Labor.	6th Labor.	7th Labor.	8th Labor.	9th Labor.	10th Labor.	Not Stated.	Totals.
230	1				1							2
231	1											1
237												1
239				1								2
240	1							1				1
243		1										1
245	1											2
247		1										2
248		2										2
250	1											3
251												1
252												1
254												3
255												1
256	1											2
257	2	1										3
258	1											3
259	1											2
260	1											3
262		1										1
263	1											2
264	2											3
266	3											4
267	1	1	2									5
268	4	1	2	1								7
269	1	1	2									5
270	3	2	1									6
271		1	2									3
272	3	3	3									8
273	3	3	1									7
274	2	4	1									7
275	2	1	1	1								6
276	4	4	1									10
277	5	1	1	1								8
278	7	3	4	1								18
279	5	3	3	3	1							15
280	2	8	3	2	1							15
281	5	8	2	1								17
282	3	4	1									8
283	5	6	3	1								16
284	1	6	2	2	2							11
285	2	2										4
286	5			1								6
287	6	3	2	1								12
288	3		3	2								9
289	4	1	1	1								9
290	3			1								4
291	2	3	2	1								9
292	3			1								5
293	1	4	1	1								8
294	1	1	2									6
295	2			1								4

TABLE I.—*Continued.*

No. of days from beginning of last catamenial flow.	1st Labor.	2d Labor.	3d Labor.	4th Labor.	5th Labor.	6th Labor.	7th Labor.	8th Labor.	9th Labor.	10th Labor.	Not Stated.	Totals.
296		1	1									293
297	3	1	2									2
298	1	1		1								3
299	1		1									1
301												1
302	1	1	1									3
303	1	1										2
304	2											2
306	1											1
307		2										2
308		1										1
309	1											1
311				1								1
317	1		1									1
327												1
330					1							1
												323

The same table as shown by weeks, is as follows:—

TABLE II.

33d week.....	3
34th ".....	1
35th ".....	5
36th ".....	9
37th ".....	14
38th ".....	13
39th ".....	41
40th ".....	78
41st ".....	75
42d ".....	50
43d ".....	18
44th ".....	11
45th ".....	2
46th ".....	1
47th ".....	1
48th ".....	1
Total.....	323

TABLE III.

Labor.	Confined within forty weeks.	Confined on or after 280th day.
1st.	54	60
2d.	34	54
3d.	28	30
4th.	10	14
5th.	7	5
6th.	5	1
7th.	2	1
8th.	2	0
9th.	1	0
10th.	1	1
Unknown.	5	8
Totals.	149	174

The earliest-born child, that lived, was one of a pair of twins. The case may be of interest. The mother was pregnant for the fifth (5th) time. In November, 1855, she had a sore mouth, which continued up to February 24th, 1856, when I was called to her. The

mouth and throat were filled with aphthæ, and "for the last twenty-four (24) hours, the saliva had been running from her constantly." There was no appetite. Gave her a mixture of conium with chlorate of potash, which afforded no relief. Up to March 1st, she got, one after another, quinia, morphia, conium, hyoscyamus and lime. The combination of quinia and morphia gave her sleep, and, while using it, the salivation diminished and the aphthæ disappeared. Once or twice daily, however, the cheeks became swollen over Steno's ducts, and there was profuse salivation to the amount of several pints a day.

March 3d, 1856. after a restless night, labor began at 9 A. M., with rupture of the membranes. The rupture took place immediately on rising from bed, and was preceded by chill and cough. I saw her at 11 A. M. Os uteri one-half dilated. Vertex in left occipito-cotyloid position. At 11.40 A. M., the first and second stages were complete. Child, male. A second child was born, also a male, and in the same position. This was at 11.50 A. M. The second child came away with its placenta and membranes not ruptured. Five (5) minutes later, the placenta of the first child was born. There was no sign of blood with either, nor was the amount of fluid large. The second child at 11, P.M., respiration never having been properly established. The first child dressed, weighed three and a half ($3\frac{1}{2}$) pounds. It lived till the 3d of the following September, when it died of cholera infantum.

The mother never had any secretion of milk. The salivation continued till the 31st of March (1856,) when it was very slight. During this time, there were days when it ceased altogether, and again when it amounted to eight (8) pints in twelve hours.

SECTION I.—SIMPLE PREGNANCY.

Simple pregnancy consists in the lodgment, retention and maintenance of a single fecundated ovum in the uterus, from the instant of conception until its expulsion.

The consideration of pregnancy involves all the phenomena pertaining to the condition of gravidity, as first, the development of the embryo and growth of the foetus; second, the various modifications of the uterus, internally and externally; its size, shape, position, structure, &c., and of the circumjacent and

distant parts; third, the special and general sympathies, including the normal and abnormal sympathetic relations; and fourth, the influence exerted upon the mental condition by pregnancy.

The first in this series of phenomena has already received a due share of attention. The second is offered for present study; while the third and fourth will be considered in connection with the diagnostic signs of pregnancy.

Of the changes effected by pregnancy. The changes effected by pregnancy on the female economy are very great, whether considered locally or generally, anatomically or physiologically.

It is difficult to reconcile the teachings of Velpeau, and repeated by Cazeaux, that speak of a fruitful coitus, in contradistinction to an unfruitful one, to their plainly expressed and decidedly more correct opinions, stated elsewhere, that lead to very opposite conclusions. In speaking of the modifications and phenomena resulting from pregnancy, Velpeau says: "The constitutional movement occasioned by copulation is only momentary, both in women and in men, when fecundation is not the result from it. In the opposite case, the state of turgescence, of erection or spasm of the uterus and tubes, continues, and is the prelude to a new kind of life in the former of these organs."* In regard to the same point Cazeaux observes: "During coition, the uterus shares in the spasm of the genital organs, and when the connection is fruitful this spasm persists much longer than usual, and the consequent sanguineous determination towards these parts sensibly increases at first the volume of the walls and subsequently dilates their cavity."†

Again Velpeau says: "When the union of the germs is effected in the interior, the new product resulting therefrom is commonly retained, or arrested in some part of the sexual system."‡ And Cazeaux, while discussing conception, observes: "Unless we admit (what analogy renders improbable) that the ovule once out of the ovarian vesicle, is not capable of fecundation, we are constrained to believe that the latter may be accomplished at whatever part of the genital organs the contact may take place."§

* Meig's Velpeau, par. 264, page 113.

† Cazeaux's Midwifery, page 80.

‡ Velpeau, par. 260, page 111.

§ Ib., page 76.

What is meant by "the contact taking place?" From the context the meaning evidently is, that the semen and ovum must come in contact to effect fecundation; and this is the conclusion at which all modern investigators have arrived. But if there remains any doubt as to the precise meaning of this remark, that doubt is effectually removed by this following observation: "It is unnecessary in our day to prove that an absolute contact of the semen of the male with the ovule of the female is indispensable to fecundation; for innumerable experiments upon living animals, and numerous facts observed in the human species, have long since demonstrated whenever any obstacle prevents the approach of the two elements a conception cannot take place."*

Now, as both of these distinguished authors agree that there must be a "union" or "contact" "of the germs," in order "to effect fecundation," and as they both teach that the ovum becomes fecundated at a great distance from the os or cervix uteri, where, under the most favorable circumstances, the semen can only be deposited, viz.: the former holds it to be in the Fallopian tube, and the latter in the tube or ovary, it follows that some time must elapse before this contact or union can be effected; because the semen or spermatozoa must traverse the cervix and cavity of the uterus a portion, one-half at least, of the tube, before the two germs meet. It has been found, by experiments upon animals, that at least twenty-four hours were required for this, and we have no reason to believe that a shorter time is required in the human female. Now unless the semen be rushed up through these passages by a *vis a tergo* at the time of copulation, so that a "union" or "contact" may take place immediately, which neither of them claims to be the case, there can be no such thing as a fruitful or unfruitful coitus determined at the time, neither by the sensation of either of the parties, nor by the physiological condition of the parts concerned; for it must take twenty or twenty-four hours before any change whatever can be effected in the ovum as the result of the connection. Velpeau makes this hypothetical fruitfulness of coitus, the cause of certain modifications of the uterus, which he regards as "a prelude to a new kind of life in the organ." Cazeaux does the same, and going further, makes it the basis of his theory of the formation of the *membrana decidua*. As we have

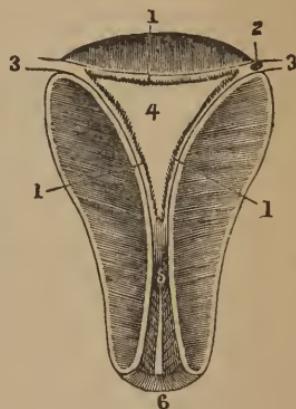
* Velpeau, page 75.

endeavored to show the fallacy of the proposition by their own teachings, we must reject their conclusions as untrue and deceptive.

1. *Of the Membrana Decidua.* The first perceptible local anatomical change that takes place *within* the uterus upon the fecundation of the ovum, is the appearance of the *membrana decidua*, lining the cavity of the uterus. This membrane has also been called *membrana cellulosa*, *sinuosa*, *spongiosa*, *common* or *pre-existing* membrane, *connecting* or *conjunctive* membrane, *epichorion*, etc. It has been distinguished by various other names by different authors, at different times and in different countries. It was named *decidua* by W. Hunter, from *decido* to fall off, on account of its coming away in small pieces, or in a state of solution with the lochia. It, or at least one layer of it, often escapes with the chorion, and attached to it. But, after being macerated in alcohol for a time, can be readily separated from it. We have been able frequently to demonstrate to the class all three of the membranes, viz.: the *decidua*, *chorion* and *amnion*, separately, from the same preparation. Fig. 51 represents a vertical section of the uterus with the *decidua in situ*, 1, 1, 1, before the ovum, 2, has arrived with the cavity; 3, 3, represents the orifice of the Fallopian tubes; 4, the cavity of the *decidua*; 5, the cavity of the neck, and 6, the *os uteri*.

Of its formation. Cazeaux says: "As previously stated, the uterus, like all the other genital organs, becomes the seat of a more energetic action, immediately after a *fruitful coitus*; in consequence of which the *blood flows there in increased quantities*, of course determining an excess of nutrition, and thus producing a marked hypertrophy in the walls of the organ. The latter is always accompanied by the secretion of coagulable lymph, a sero-albuminous fluid which soon fills up the uterine cavity; and if the mucous membrane be examined at this juncture, the villosities that existed, and were exceedingly short in the unimpregnated state, will now

FIG. 51.



be found, says Baër, to have undergone a considerable elongation; and, as these hypertrophied villi project above the surface of the membrane, they are naturally bathed in the liquid just spoken of. In the course of a few days, the latter thickens, and its exterior particles, by becoming more consistent, form a soft, pulpy membrane, which lines the whole internal surface of the womb, thereby constituting a true sack that is externally in contact with the mucous membrane throughout, and is filled by a colorless, mucoid, albuminous liquid. From its position, this pouch must evidently assume the shape of the uterine cavity, upon which, indeed, it seems to be moulded. The vascular villi of the mucous membrane appear to ramify in its substance *ad infinitum*, being accompanied by the capillary network that surrounds them, and which has likewise taken on a considerable development."

The italicizing in the first two instances, is our own. This whole theory of the formation of the decidua is based upon the hypothetical assumption of a "fruitful coitus," which we have shown by his own teachings and facts to be entirely fallacious. Another fallacy, based upon this one, he offers as the immediate cause, producing the results which he claims as an explanation of his hypothesis, viz.: "the blood flows there in increased quantities," this is synonymous with the expression of "a determination of blood to the parts," or "a sanguineous determination to the parts." Our author uses this hackneyed medical cant, doubtless, without due thought or reflection, or he would not have fallen into the common error of medical writers; one that has been perpetuated from time immemorial, and used alike by the wise and unwise, the thoughtful and the reckless. How is the intelligent and inquiring student to reconcile his knowledge of the anatomy of the circulatory system and the heart's action with either of the above-mentioned expressions? He knows the arterial tubes do not dilate to allow an extra quantum of blood to pass to a certain part at different times. He knows also that the normal actions of the heart are uniform, and that it has no choice or election in its distribution of the blood it propels throughout the body, to send more to one part than is its due, at one time, and more to another, at another time. He knows also, that if its action is accelerated or diminished from any cause whatever, that the whole

system received the impression, and not one part, as the genital apparatus, the liver, the lungs or the brain, while all the other parts remain unaffected. He knows if the heart acts rapidly, the blood is sent rapidly throughout the system—and the *whole* system, and if it acts tardily the blood is sent tardily throughout the system—and the *whole* system. But he knows nothing about the determination of blood to one part or another, to the exclusion of all the rest of the body. He cannot reconcile this phrase to his knowledge of the circulatory system and the circulation. But he can very easily conceive of a relaxation of the capillaries of any given part, and their inability to contract and force the blood out of them, and that the continued contractions of the heart, repeatedly forcing the blood into them, causes an engorgement or turgescence of the capillaries, and a swelling of the part. . He can understand *stagnation* much better than “determination,” as applied to this condition.

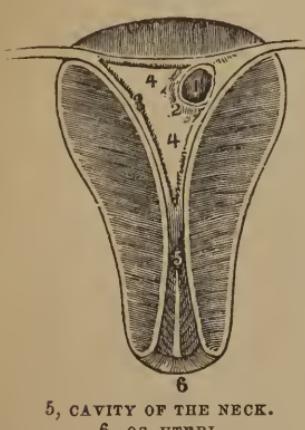
Now, if our author's premises are untenable; if his immediately “fruitful coitus” and his “sanguineous determination,”—the two pillars upon which he erects his theoretical structures,—are but unmeaning words, or nonentities, his conclusions must fall, and his theory degenerates into a mere hypothetical myth. We have no reason to doubt the facts as stated by him in relation to the primitive condition of the forming decidua. These are admitted; but the causes he assigns for them are evidently insufficient, and others must be sought after.

The weight of authority preponderates vastly in favor of its consisting originally of a fluid or semi-fluid substance of some sort. It has been described by different writers, most of whom claim to have examined it, as a coagulable lymph, Dr. Hunter; coagulable blood, Mr. John Hunter; a firm, tough gelatine, Mr. Burns; at first in a semi-fluid state, Rigby; a tenacious fluid, Ramsbotham, etc., etc. There can be no doubt but that it presents different appearances, in different cases, but always tending towards condensation into a membranous structure of a certain density. Velpau says: “Impregnation determines in the uterus a specific irritation, which is promptly followed by an exudation of coagulable matter, which concretes and soon transforms itself

into a kind of sack, filled with a transparent and slightly rosy fluid.

The decidua consists of two layers, the external and the internal.

FIG. 52.



The external is called the *decidua vera*, the internal the *decidua reflexa*. The latter is only a reflection of the former, produced by the ovum, 1, (Fig. 52,) pressing against the decidua, 2, as it enters the uterine cavity, and as it enlarges, the reflexed decidua increases proportionally, while the decidua vera, 3, increases with the enlarging uterus. And the space between the two layers, 4, 4, corresponds to the difference of size between the ovum and the cavity of the uterus, which space continues to be

occupied by the fluid already mentioned. This space decreases as the ovum increases in size and fills up the cavity. At about the fourth month the two layers come in contact with each other, in consequence of the entire obliteration of the decidual cavity. The union between the two layers never becomes so intimate as to render them inseparable.

The name of *decidua reflexa* was given to the internal layer by Dr. Hunter, who discovered it.

Dr. Bailie distinguishes them by terms more in accordance with their relative position. The layer, in contact with the uterus, he calls the *decidua uteri*; and that next to the ovum, the *decidua ovari*.

The decidua is an inorganic structure. It possesses neither blood vessels, nerves nor lymphatics, and is entirely destitute of the elements of organization.

For a further consideration of this structure, its use, etc., the reader is referred to the article on "Human Conception," page 135.

2. *Of the Chorion.* By continuing our researches within the cavity of the gravid uterus, our attention is next arrested by the chorion, (from *xopiov, korion*, "skin," from *xwpeiv, korein*, "to contain,"—include, Camisia Fœtus, the *chemise*, or shirt, of the fœtus in utero,) a thin, transparent membrane, which surrounds the

fœtus in utero on every side. The student is already familiar with the formation of the chorion; how it is produced from the degenerated vitellus, and forms the outer layer of the blastodermic membrane; and that, nearly from the first, it is flocculent, and studded all over with villi. Almost from the first, the chorion presents the appearance of a small velvet-like vesicle. The villi are confined to the external surface; the internal is smooth and polished. It is filled with a thin, transparent serous fluid.

It was formerly supposed that these villi were of a vascular nature; but as early as 1823 Velpeau opposed this hypothesis. They are now acknowledged to be solid cellular filaments, and are found to form certain areolar spongiolas, and are not hollow tubes. The villi increase in size until about the second month, when the external surface of the chorion becomes covered with a thick flocculent crust, consisting of numerous striated lamini. It is exceedingly rough and shaggy on the peripheral surface. At three months this shaggy crust begins to diminish; at four months it is almost entirely removed; and at five or six months the chorion is perfectly transparent, except at that point where the placenta has been formed, in which formation the villi constitute a very important auxiliary. The transparency of the chorion is perfected in proportion to the development of the placenta. The evident use of the villi is to absorb moisture from the uterine cavity, and thus afford nourishment to the embryo, until the placenta is sufficiently developed, and a connection between it and the maternal structures established. When this becomes effected, the embryo draws its sustenance directly from the mother through the umbilical vessels. The villi being of no further use they become atrophied, and finally disappear altogether.

The chorion is a part of the ovum, and always, both in uterine and extra-uterine pregnancies, forms its external coat. During the first few weeks of pregnancy it is separated from the amnios by a thin stratum of fluid. As pregnancy advances this becomes gradually absorbed, so that at term the two membranes are found in contact. This, however, is not invariably the case; sometimes a considerable quantity of fluid is retained between them throughout the whole of gestation. It has been called the liquor chorii, or false waters. Some years ago I was called upon to visit a lady,

who was seven months gone in pregnancy. I was informed that her waters had broken a few hours before my arrival, and a considerable quantity discharged. There was no pain, nor any other symptoms of premature delivery, save the one mentioned. I directed her to lie down and keep quiet, and wait for further developments. She observed the directions strictly, experienced no further inconvenience, went her time out, and was then delivered of a full-grown, well-formed living female child. Since this occurrence, I was called in consultation, to a case of lingering and protracted labor. I was informed by the accoucheur in attendance, that the waters had been discharged for several hours, but there was no change in the character of the labor; that there was no increase in the frequency or efficiency of the pains. I proceeded to examine the case during a pain, and found a bag of waters occupying the os uteri, which was dilated and in a favorable condition, as were also the other parts concerned. I at once ruptured the protruding membrane, and let off the liquor amnii. There was an immediate change in the condition of affairs; the pains becoming more frequent and stronger, and in due time a fine, large, healthy, living boy was born without any further interruption or delay. Now there is not the least doubt that the first discharges, in both of these cases were the liquors of the chorion; that the amnion remained entire, and the liquor amnii was retained, until the last. Nor is there any doubt that in those cases of a supposed premature discharge of the liquor amnii, that may be found reported in almost any of the books, as occurring two or three months previous to term, are cases of a premature rupturing of the chorion, and an escape of the liquor chorii, in which the amnion has remained entire, and the full term has been attained without further mishap.

The chorion is very variable in regard to its strength. In some instances it is very strong and resisting; refusing to give way under the most powerful uterine contractions. Indeed I have seen cases where the ovum has been expelled entire, at full term, and where the child has been saved from suffocation only by the timely application of an edged instrument, to overcome the resistance of the enduring membrane. It frequently occurs that the strength of the chorion is such, that it resists the ordinary

and natural means of rupturing it, far beyond the proper time, and requires the application of extraneous force to effect its solution and secure the timely escape of the waters.

On the other hand it is so remarkably weak and unresisting, sometimes, that it gives way upon the slightest pressure, induced by the first contractile effort of the uterus; when even so slight as not to be accompanied by the least perceptible sensation, and the first intimation the woman has of approaching labor is a sudden and copious gush of waters. Indeed it occasionally yields to the simple pressure of the contained liquor alone, without any uterine action whatever, and that too prematurely; and when attended with the escape of the liquor amnii, it becomes the cause of premature delivery.

The chorion, like the decidua possessed neither blood vessels, nerves nor lymphatics, and is also destitute of the elements of organization, except that part of it, perhaps, which is occupied by the placenta. It is said to afford covering for the umbilical cord, but this is exceedingly doubtful.

3. *Of the Amnion or Amnios.* The amnios (from *αμνος*, *amnos*, "a sheep"). So called because it was first observed in the sheep. It is also called *amnion*, *amnium*, *charta virginea*, *armatura*, etc. A thin, transparent membrane, the innermost of the envelopes of the foetus. If the student will take the trouble to turn back and review the development of the fecundated ovum, as illustrated in Figs. 44, 46, 45 and 47, he will observe in 44 that the folds of the blastodermic membrane, 1, 1, are approaching each other very closely, as also are the cephalic and caudal hoods, 2, 2. In Fig. 45, the folds, 4, 4, have met at the point, 5, forming a bridge or septum, which is observed. The hoods, 6, 6, are enlarged, and are proximating each other, to envelope the pedicles of the umbilical vesicle and allantois, 1, 2, which constitute the rudiments of the umbilical cord. In 46, the bridge or septum five has disappeared, and the interior figure, 5, 5, is the amnion. The hoods 4, 4, are still more enlarged, and are closing in closer upon the rudimental umbilical cord. In 47, which represents the human ovum, the amnion, 5, 5, is almost perfected by the near approach of the hoods, 4, 4, and their close proximity to the rudimental cord; the amnion in this way ultimately embraces the

cord tightly and forms its sheath, while the round, broad turns of the hoods reflect themselves over the foetal surface of the rudimental placenta, and finally supply that surface with a permanent investment, which constitutes its inner lining. The experiments and demonstrations of M. Coste, Dr. Wagner, Bischoff, and others, prove that the amnion and not the chorion furnishes the lining for the inner surface of the placenta and the sheath for the umbilical cord, notwithstanding the opinions and theoretical notions of all their predecessors and many of their contemporaries, to the contrary.

Previous to the investigations of the above mentioned distinguished anatomists, and their co-laborers in the cause of science, which brought to light the mysterious phenomenon of embryonic developments and established the truth of the various processes that were only hypothetical theories, the pretended explanations were most contradictory and unsatisfactory. It is not surprising therefore that there should have been so much vagueness, and so little precision, in regard to this highly interesting subject. As a review of the various theories and hypotheses, that have from time to time been enunciated as scientific truths, would be a sheer waste of time, the student is referred to the several authors who have dwelt upon the subject at length, as the exhibitors of curiosities, rather than the producers of ingenious or intelligible theories.

As the amnios is a part of the unfolding ovum,—a petal in the opening flower,—its development is simultaneous with that of the embryo, chorion, etc. Therefore, to say it was developed before or after, any other part of the ovum, or that it was spread out over the placenta or along the length of the cord, after their formation was far advanced or complete, would be conveying an erroneous idea. If the student has patiently studied, and fully comprehends, the article on embryography, he can have no difficulty in understanding the formation of the amnion, out of the graceful foldings of the chorion, which was originally known as the outer layer of the blastodermic membrane. By recurring again to the Figs. already alluded to, it will be observed that the amnion is attached to each extremity of the embryo, leaving the ventral portion to be occupied by the pedicles of the umbilical vesicle and allantois. As

the venter closes up by the addition of newly formed tissues, the two portions of the amnios are carried towards each other, until they meet, and enclose the umbilical cord at the navel—and, until after the second month, a portion of the intestinal mass is included, which renders the cord larger at this extremity than at any other part. Thus it can be seen how the amnios is attached to the abdomen of the foetus, from which it appears to emanate.

About an inch or an inch and a quarter from the insertion of the cord into the placenta, the attachment of the amnios to it ceases, and the membrane spreads out upon the placenta, leaving a funnel-shaped process, through which the substances of the cord passes unconnected with the amnios: this process is called *processus infundibuliformis*.

It has already been stated that the amnios is separated from the chorion, during the earlier weeks of pregnancy by a tolerably thick stratum of fluid, which resembles the liquor amnii; but as the growth of the amnios exceeds that of the chorion, the space between them gradually diminishes, and the intermediate fluid becomes compressed into a sort of gelatinous substance, which, by further pressure, becomes still more condensed, until a kind of membranous structure is formed. This structure Bischoff calls *the membrana media*. Wagner describes it as resembling the inter-muscular cellular tissue, and Velpeau has given it the name of the *vitriform* or *reticulated* body. Cazeaux thinks he is certainly wrong in considering it as analogous with the allantois.

At four or five months the intermediate space between the amnios and chorion is obliterated, and the two membranes come in contact, which contact is maintained during the remainder of the term, becoming more and more intimate the nearer it approaches its termination; those cases where the liquor chorii is present during the whole of pregnancy, constituting exceptions to the rule.

The amnios is said to possess much greater tenuity than the chorion, and also greater strength and toughness. Inasmuch as the former is originally but a continuation of the latter, it is not probable there is so great a difference between them, uniformly, as is alleged to be. In those cases of a premature escape of the liquor amnii, or where the membranes are ruptured from a trifling cause, both appear to be defective in strength alike; and where they maintain their integrity an undue length of time they evince an excess

of strength and endurance alike, and where the membranes rupture at the proper time, they manifest a similarity of condition, opposed to the idea of any remarkable difference between them.

The amnios contains a quantity of fluid, in which the foetus floats, termed the liquor amnii. Fig. 50, represents the amnios, 2, through the walls of which are seen the liquor amnii and embryo; the chorion, 1, 1, being opened to admit of the view.

The internal surface of the membrane is very smooth, while the external is somewhat rougher, in consequence of its contact with the chorion.

It is regarded by different authors as possessing various functions. Dr. Dunglison calls it a perspirable membrane, and says: "It possesses many colorless vessels, which have not been injected." The proof of the presence of vessels consists in their capability of being injected. Ramsbotham says: "it enjoys in an eminent degree the power of secretion. It is destitute of colored vessels, but it too must possess vascularity." Burns says: "it is totally without the appearance of either vessels or regular fibres." Gooch remarks: "No vessels have been discovered in it even with the aid of injections." Rigly observes that: "Blood vessels and nerves have not as yet been discovered in the structure of the amnion." Velpeau says: "Nothing leads us to admit of the existence of vessels in the amnios." Cazeaux remarks: "Of course it would be more firm and consistent, acquiring by time a greater resemblance to the serous membranes, although it neither encloses nor possesses vessels at any period."

According to Todd and Bowman: "No vessels, nerves, or lymphatics have yet been demonstrated in the healthy membrane. But in some cases of disease it has been found highly vascular."

Thus it is held to be vascular and not vascular, perspirable and not perspirable, secretory and not secretory, and resembling serous membranes—without possessing the elements of serous membranes.

As neither the microscope nor the finest injections have been able to demonstrate the existence of vessels of any kind in the amnios, nor has the advocates of such an existence undertaken to show the origin, distribution or termination of the vessels they claim to exist in the structure, their presence must be regarded as

extremely improbable. If then there are neither vessels, tubes nor pores of any kind, there can be neither perspiration nor secretion. A desire to account for the presence of the fluid in the amnionic sac, has led some to conclude that there must be present in the membrane the means of secretion or perspiration ; another instance of grave conclusion drawn from untenable premises.

All that is really known of the functions or use of the amnios is, that it constitutes a sac for containing the liquor amnii, foetus and umbilical cord ; and a sheath for the umbilical cord, and a covering for the foetal surface of the placenta, and more than this is mere conjecture.

4. *Of the Liquor Amnii.* The fluid contained in the amnionic sac, in which the embryo, foetus and cord are submerged, is known as the liquor amnii. It exists in different proportions, compared with the bulk of the embryo or foetus, at different periods of intra-uterine life. From the first to near the middle of gestation the weight of the waters exceeds that of the embryo. But after that time, from the more rapid growth of the foetus, its weight exceeds that of the waters, and towards the close of pregnancy, this excess is vastly augmented, so much so, that at term, a foetus weighing seven or eight pounds, will be found floating in not more than one or two pounds of water. Frequently at birth the quantity of the liquor amnii is in inverse ration to the bulk and weight of the foetus, and the robust constitution of the woman. Velpeau says : "that a foetus weighing five pounds, for example, will float in two, three, or four pounds of water, while only three or four spoonfuls will be found about a child of eight or nine pounds weight." In speaking of the relative proportions between the quantity of liquor amnii, and the bulk and weight of the foetus, Cazeaux observes : "the variations on this head are infinite, even at the time of the accouchment." From my own experience, I should hesitate to say that enough cases exist, of sufficient uniformity, in regard to these relative proportions, to constitute a basis upon which to establish a rule, for making anything like a correct estimate of them. Cases are frequently met with, in which the observations of Velpeau are verified ; so also in regard to the declarations of Cazeaux. Such I presume would be the testimony of every experienced accoucheur.

The properties of the Liquor Amnii. It is a thin, transparent fluid, unctuous, rather thicker than pure serum, often colorless, but occasionally it is lactescent, or milky, sometimes of a greenish or slightly citron, or brownish color, with albuminous flocks, of a whitish, yellowish or black color, floating in it. It has a peculiar sickly odor, which has been compared to that of the flowers of the horse chestnut, or the smell arising from the bellies of slaughtered animals; its taste is sweetish and slightly saline. It is astringent and puckers the skin of the fingers, like that of the hands of a washerwoman, upon remaining a few minutes in contact with it in the uterus or vagina; sometimes it is even acrid. It is said to derive its greenish hue from the meconium of the foetus. If this were so, it should be uniformly of that color, which is known not to be the case. It is not at all certain that the bowels are ever evacuated during intra-uterine existence; nor that any injury would result to the foetus, in consequence of the absence of such evacuation, as cases of imperforate ani are not very rare, in well developed and apparently healthy children. Others aver that the color of the fluid is derived from the medicines taken by the woman during her pregnancy; an hypothesis that would appear quite as rational as the former, could it be shown that there existed any communication between the liquor amnii and the circulating fluids of the mother. In the absence of any proof of such a communication, we are constrained to suspend an opinion in regard to the accuracy of the latter position.

Its Chemical properties. The student is indebted to Todd and Bowman for the following analysis of a specimen taken from the body of a woman who died at the eighth month of pregnancy. The examination was made by Dr. Beale, for Dr. A. Favre.

The specific gravity of this specimen was 1009.2, and it contains 1000 parts.

Water	982.00	In one hundred parts
Solid matter	18.00	of solid matter.
Organic matter soluble in water	6.11—	32.94.
Fixed alkaline salts	8.09	44.91.
Albumen, earthy salts and fatty matter .	3.80	21.11.

According to Vogt the liquor amnii consists of common salt,

lactate of soda, albumen and sulphate and phosphate of lime. A specimen of liquor amnii at three and a half months, had a specific gravity of 1.0182, and contained 10.77 of albumen in 1000 parts, and one at six months had a specific gravity of 1.0092, and contained only 6.67 parts of albumen per 1000. It is interesting to observe that the composition of the liquor amnii varies at different periods of pregnancy, as has been shown by Vogt; and during the earlier periods of gestation, the quantity of chloride of sodium is much greater than during the latter part of the time. The proportion of this substance appears to be greater at that period of the development of the embryo, when cell multiplication and growth is most active.

Dr. Prout found sugar of milk in the liquor amnii of a cow, at an early period of pregnancy.

Whence is it derived? It is held by some physiologists, that the woman furnishes the liquor amnii directly from her own fluids, among whom may be mentioned the names of Monroe and Haller.

Others regard it as an emanation from the foetus, as Scheele, Winslow, Van-den-bosh, and M. Lobstein.

While others again contend that both woman and foetus are concerned in its production, prominent amongst whom are Chausnier, Meckel, Beclard, and Cazeaux.

The first hypothesis is based mainly upon some experiments by Monroe, in which he found that the warm water he injected into the veins of the uterus, had passed into the cavity of amnion. And upon the assertion of Haller, that the waters become impregnated with the odor, color, and even the nature of the medical substances taken by the woman. The second derives its support from the circumstance of an accumulation of perspirable and urinary matter within the amnios, from the body of the foetus; which is strengthened by the certainty that urinary discharges are essential to foetal life, as Billard and T. W. King have seen cases of ruptured bladder induced by imperforate urethra, and two cases of still-born children are cited by Desormeaux and P. Dubois, where the bladder and uretus were enormously enlarged; and both kidneys, from a regurgitation of the urine, were converted into numerous cysts, filled with that fluid, resulting from an obliteration of the urethral canal. These facts prove

conclusively, as far as they go, the necessity of urinary evacuations to the maintenance of foetal life. But they are very far from establishing the identity between urine and the liquor amnii. That there is urine mixed with the latter there is no doubt, as Dr. Beale has discovered by means of the microscope *casts of the uriniferous tubes* of the kidney of the foetus, in a specimen of liquor amnii taken from a woman who died at eight months of pregnancy. And further, Dr. G. O. Rees has found *urea* in the liquors of the amnios, and other investigators have confirmed the observation.

These experiments and observations prove, indisputably, that at an advanced period of gestation, urine, in greater or less quantities, enters into the composition of the liquor amnii. But other facts opposed to the hypothesis of the waters being entirely supplied by the foetus, are equally conclusive. Like the chorion, the amnion, and the embryo, the liquor amnii is one of the original constituents of the ovum, and co-existent with its earliest unfolding. It is present for weeks before the kidneys or any other of the urinary organs have commenced even their rudimental development; before there is any embryonic circulation or circulatory system unfolded; before there is any secretory apparatus, either of the skin or other parts of the foetal body, established; before, therefore, there can be any secretions whatever, either of the kidneys or skin. If the embryo then, is incapacitated, from its extremely imperfect organization, to supply any portion of the liquor amnii, it follows as a necessity that the maternal structure must produce it.

It is not at all certain that the foetus supplies any considerable portion of it, as it has been shown that the bulk and weight of the waters, in the early months of pregnancy, when the foetus is least capacitated to produce it, are in excess, compared with the size and weight of the latter; but, in the latter months of gestation, when its capacity for eliminating both urine and perspiration is vastly augmented, and it would be reasonable to suppose that a large amount of fluid might accumulate from this source, it is found that the excess is greatly in favor of the foetus, and instead of there being a great proportional increase, there is an astonishing decrease of the water when compared with the foetus. These

facts show that a very small portion of the liquid only, is derived from the foetus, and that it is mainly, and for the first three or four months entirely, supplied by the woman.

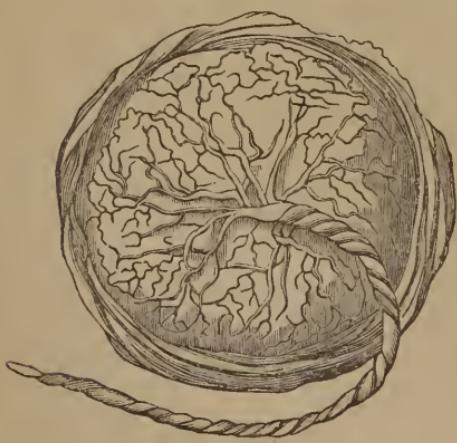
The next question of interest connected with this mysterious product is, how is it eliminated from the female structures? In the absence of all proof of the existence of vessels of any kind in the amnios, the receptacle of the liquor amnii, and its separation from the organized structures by two inorganic layers, viz.: the decidua and chorion, the possibility of its being an ordinary secretion is utterly precluded. Velpeau has given the most satisfactory solution to this very difficult problem, of any that has been offered, either by his predecessors or successors, and the one that is generally accepted at the present day as the most philosophical. He says: "That every thing proves that the water of the amnios is the product of transudation, or of a simple exhalation; that it is an instance of mere vital imbibition, and that it does not require for its production the existence of special canals." This opinion certainly derives support from the peculiar structure of the envelopes of the embryo. The villous coat of the chorion, during the earlier months, absorbs the moisture of the uterus, and transmits it to the cavity of the membranes by an endosmotic process, and during the latter months, a similar process may perhaps be carried on through the medium of the decidua.

Its uses. These are: 1. To maintain a sufficient space to enable the growth of the foetus to proceed without being interfered with by undue pressure from the firm, unyielding structures of the uterus. 2. To make a gentle and uniform pressure on all parts of the foetal body, similar to that of the atmosphere of the outer world upon the bodies of all animal existences; to counteract the heart's action, and maintain the integrity of the channels of the circulation. 3. To keep the skin soft and flexible. 4. To prevent an adhesion of the limbs to the body, and to the parts where they are in contact with themselves, in a state of flexion. 5. It enters the mouth, the stomach, and perhaps the bronchial tubes, to preserve the cavities of these viscera during their primitive development, and it is thought to contribute somewhat towards nourishing the foetus. 6. It serves to lubricate and soften the parts during parturition. 7. Its presence facilitates the operation of turning, and favors the active and passive movements of the foetus, etc., etc.

5. *Of the Placenta.* The placenta. (From *πλακοῦς*, *plakous*, "a cake," so called from its resemblance to a cake; the *after-birth*, "secundines"). This is a vascular mass, constituting a part of the ovum, and through the medium of which the foetus is connected directly to the uterus. It is found in all the mammiferous animals, possessing a variety of shapes, according to the different species. In the human subject it is circular, oval, and sometimes reniform or kidney-shaped. It is from six to eight inches in diameter, and from one inch to an inch and a half in thickness; in its thickest part, which is generally near its centre, at which point it receives the insertion of the umbilical cord. When it is round and the cord is inserted near the centre, it gradually diminishes in thickness towards the circumference, where it becomes very thin, comparatively, not more than two or three lines thick. In some instances the cord is inserted towards one edge, at which point it is of the greatest thickness. In the oval or reniform specimens the cord is generally attached somewhere nearer the edge than the centre. The thin edge of the circumference is attached to the decidua throughout its whole extent, giving it the appearance of a continuation of the structure. (Fig. 55 1, 1). When the cord is inserted near the edge, it constitutes what is termed *placenta en raquette*, (battledore placenta).

The placenta presents two surfaces, the internal and external, or the foetal and uterine or maternal surfaces. The former is

FIG. 53.



smooth and polished, being covered with the amnios, beneath which the vessels of the cord can be seen diverging and creeping over a large part of the central portion of the organ, into the substance of which they penetrate and ramify in an infinite degree of divisibility, as is represented by Fig. 53. The vessels of the cord consist of two arteries and one vein.

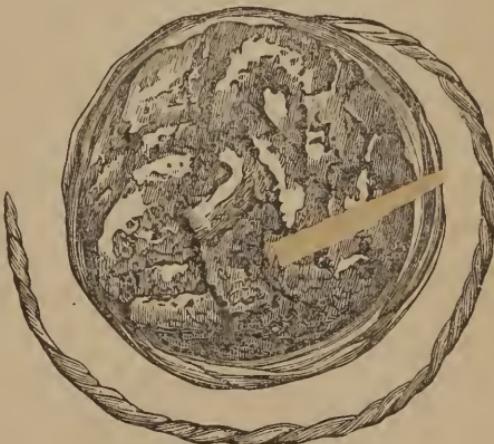
The former, termed umbilical arteries, spring off from the internal iliacs of the foetus, and come together at the umbilicus; thence they pass to the placenta, through and constituting an element of the umbilical cord, where they divide and sub-divide into a vast number of small branches, which ramify throughout the entire mass, Figs. 53 and 55, 2, 2, 2, 2. The vein is formed by a similar number of small venous tubes, running into each other, forming larger branches, and these again uniting to form still larger ones, until they all converge into one vessel, which is denominated the umbilical vein. The arteries convey the blood from the foetus to the placenta, and the vein carries it from the placenta to the foetus. These vessels do not maintain their distinctive characters after they enter the substance of the placenta, to the same extent that they do while in the cord; for each arterial branch is accompanied by a venous one, throughout their most minute ramifications. Dr. Hunter observes: "These cling to one another, and frequently in the substance of the placenta, entwine around one another as the navel string."

The external, uterine or maternal surface is exceedingly uneven and lobulated, being made up of elevations and depressions, as exhibited in Fig. 54. These lobes or elevations are very irregular in shape, and the depressions or fissures between them are of unequal depth.

The lobes are termed cotyledons (from *κοτυληδων*, *kotyledon*, a cavity). And the depression between the cotyledons are termed sulci, (from the French *sillon*,) a groove or furrow (Fig. 54).

While the placenta is *in situ* in the uterus, these cotyledons and sulci are not observable. It is only after it is removed that they

FIG. 54.



become apparent. The uterine surfacee is lined by an extremely delicate membrane or pellicle, which is soluble in water and easily removed by maceration, Fig. 55, 3, 3. It is very easily lacerated, which sometimes occurs, upon the placenta being separated from the uterus. This structure has been denominated the inter-utero-placental eaduea or decidua, and prevents the placental structure from coming in direct contact with the uterine surfacee. Velpeau attributes the visibility of the sulei and the recognition of the cotyledons to a laceration of the membranule, during its separation from the uterus. He maintains that the pellicle extends from the summit of one cotyledon to that of another, similar to the disposition of the arachnoid on the brain.

The smoothness of this surface, and the obscurity of its unevenness while in situ, is dependent upon its compactness. The economizing of space is necessary for the accommodation of all parts of the ovum while in utero; but as soon as it is relieved from the pressure incident to its situation, the lobes and fissures become apparent. From repeated observation on the recent and prepared specimens, I am convinced that the membranule passes over the cotyledons, and dips down into the sulei between them, throughout the entire surfacee, and their visibility is not dependent upon the accidental laceration of the pellicle, but is the legitimate result of its natural construction. The membranule is not an organized tissue, but merely a membraniform concretion, easily destroyed by maceration in water. It has been alleged by authors that the inter-utero-placental membranule contains numerous vessels; but this observation is not sustained by my own experience. It is denied by Velpeau, who asserts that "it contains no vessels, and the idea of a circular venous sinus, which, according to the reports of certain anatomists, exists along the circumference of the placenta, can only be the result of a careless observation." During the primitive formation of the placenta no traces of the pellicle can be seen; it is not apparent until after the organ has acquired a good degree of firmness; about the fourth month it is plainly discernible. It is continuous with the caducus membrane and, according to M. Jacquemier, is one and the same structure.

The placental mass is fundamentally composed of blood vessels, and each cotyledon is composed of a congeries of minute arteries

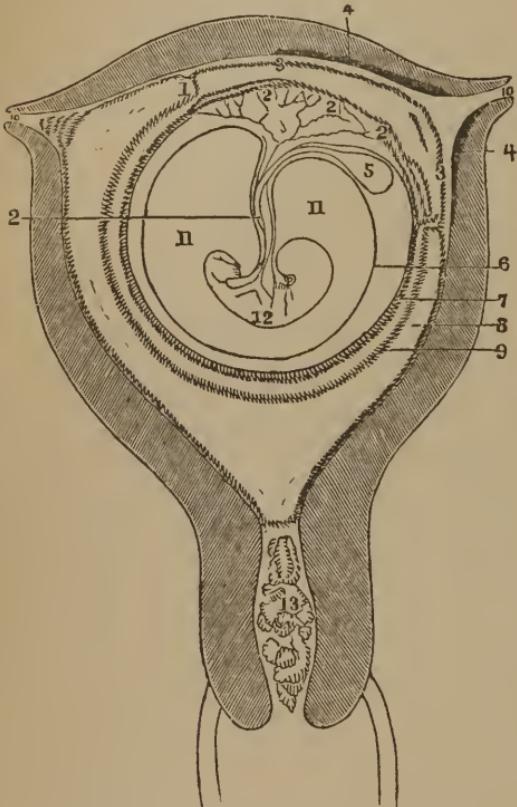
and veins, spirally arranged, and held together in bundles by fibrous tissue. These fine vessels, according to Rigby, communicate with each other, as an injection thrown into the umbilical vein, or one of the arteries, and will pass into both the fine arteries and veins. These bundles of small vessels that constitute the basis of the cotyledons, form the parechyma of the placenta, which may be regarded as an aggregation of a number of miniature placenta, as each lobe is distinct, having no vascular communication with its fellow. It has been asserted by some of the older writers, that the placenta contains *glands* and *lymphatics*, but these have never been satisfactorily demonstrated. Neither has it been proven that it contains *nerves*.

The uterine surface of the placenta is much more spongy and less firm than the foetal face. On this account, and from some other circumstances, it has been held by some anatomists that the placenta originally consists of two separate halves, one of which is developed in connection with the uterine structures, and that the other is formed by the divergence, infinite division, and anastomosis of the umbilical vessels, and that during gestation these two halves become agglutinated and coalesced into one substance. This view of the primitive condition of the placenta cannot be entertained by any one who is at all conversant with the early formation of the organ. Though a plurality of placentæ are cognizable in some of the lower mammiferæ, such an arrangement in simple pregnancies is not common to the human species, notwithstanding two or three anomalous cases of the sort are recorded; one of which recently occurred at the clinic of the Berlin Hospital, where a doubl' placenta was attached to a single child. Another similar instance is furnished by Dr. Ebert, in which the vein bifurcated about four inches from the placenta, a branch accompanied by two arteries was sent to each placenta.

Of its Development. As the ovum enters the uterus from the Fallopian tube it presses the decidua before it, and in this way comes in direct contact with the mucous membrane, lining the cavity. Not being larger than a mustard seed, and very compressible, it could not well remain in contact with a surface, the comparative size of which is so much greater than its own, without subjecting near one-half of its periphery to the contact. The

chorion, being covered on its external surface with villi, one-half of which mingle and intermingle with the villi of lining membrane of the uterus, form an intimate relation between the two adherent

FIG. 55.



IMPREGNATED UTERUS AT A VERY EARLY PERIOD.

1, 1, Functions of reflexed decidua and circumference of the placenta; 2, 2, 2, 2, The umbilical artery and its ramifications, originally the allantois; 3, 3, The utero-placental membranule; 4, 4, The hypertrophied mucous membrane of the uterus, at the attachment of the placenta; 5, The umbilical vesicle; 6, The amnion; 7, The chorion; 8, The decidua vera; 9, Decidua reflexa; 10, 10, Orifices of the Fallopian tubes; 11, 11, Amniotic cavity; 12, Embryo; 13, The mucous plug, in the cavity of the neck.

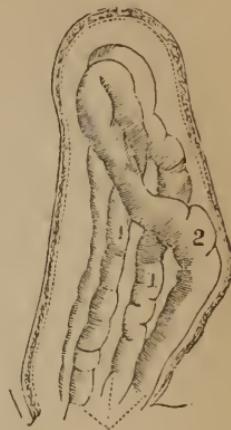
surfaces which constitutes the first or preparatory process in the development of the placenta. The umbilical arteries, springing up from the internal iliacs, are carried by the allantois, an organ that appears to be destined to that end, to the chorion, the villi of which they enter by their small terminal branches, Fig. 55, thus causing their length and size to be increased above those on any other part of the chorion, as is represented in Fig. 47. These villi and their contained arterial filaments intermingling with those of the lining membrane of the uterus, each of which also contains an artery and vein, cause them to be augmented in size also; which augmentation, it is observed, causes a thickening and softening

of the mucous membrane, which increase as the rudimental placenta becomes more and more developed. All that is observable, at this stage of pregnancy, (about the last of the eighth week,) of the placenta is an increased vascularity and a puffiness of the mucous membrane, and some very loosely-arranged vascular

structures at the locality destined for its subsequent development, Fig. 55, 2, 2, 2, and 4, 4. Here commences the foetal circulation, with the development of the rudimental umbilical vein by cell formation, a very minute branch of which is seen to accompany each arterial branch. The foetal circulation is not established by anastomosis, as has been asserted by some anatomists. Anastomosis (from *ανα*, *ana*, "with," and *στόμα*, *stoma*, a mouth,) consists of vessels running into each other, as the vessels of the placenta running into those of the uterus, and receiving the blood directly therefrom, would afford an instance. If this were the case there would be no difficulty in passing an injection from the uterus to the placenta, and *vice versa*. MM. Dubois and Biancini own that they have effected such injections. Velpeau says: "I have vainly sought for those *utero-placental vessels* in a great number of cases." Dr. Meigs says: "I have carefully witnessed the anatomical separation of the ovum from the womb at full time, and could never see the smallest vessel passing from one to the other. I do not believe there is any *utero-placental circulation* appreciable by the senses." We have frequently examined recent placentæ, with a view of detecting the *utero-placental vessels*, and have carefully macerated them in alcohol, to harden the structures, and then repeated the search, but have never been able to find the least trace of vessels penetrating the pellie.

It may be said that a great amount of negative testimony is required to invalidate a well authenticated, positively asserted fact. It is not designed to deny the declarations of these distinguished anatomists, but to offer an explanation of the apparently contradictory evidence. It is well known that anatomy is prolific in anomalies, and these are as likely to exist here as elsewhere; and again, it is by no means uncommon for abnormal, organized adhesions to occur between the placenta and the uterus, in either case a *utero-placental injection* could be easily affected; and we have no evidence that one or the other of these conditions might not

FIG. 56.



have been present, in the instances above stated. Velpeau further observes "the condition of the parts has convinced me that if they do sometimes exist, they are far more frequently wanting." The weight of authority at present preponderates greatly in favor of a non-direct inter-utero-placental circulation, let what opinions be entertained that may, in regard to the minute primary structure of the placenta.

If there is not a direct vascular communication between the placenta and uterus, the utero-placental circulation must be affected through other agencies; these are exosmosis and endosmosis. Exosmosis (from *εξ*, *ex*, "out," and *ωσμος*, *osmos*, "impulse,") to pass or transude out, from within an animal or other membrane. It consists, in this case, of the transudation of the blood through the thin walls of the minute arterial branches, by which the hypertrophied space of the uterus, occupied by the placenta, is supplied. Endosmosis (from *εν*, *en*, "in," and *ωσμος*, *osmos*, "impulse,") to pass by transudation from without to within. In the present instance it is expressive of the act of the blood, transuded from the uterine arteries, passing into the placental branches of the umbilical vein. In like manner is the blood transuded from the umbilical arteries, taken up by the uterine veins. In order to effect this endosmotic process, the placental veins are first developed, by the formation of tufts, or bunches of infinitely fine venous fibres, enveloped in a proper tunic, from each of which a prolongation projects, which constitutes a primary branch of the umbilical vein (Fig. 56). Into these tufts the fine branches of the maternal arteries enter, 2, 1, 1, and here is performed the exosmotic and endosmotic processes. In like manner is the extreme uterine veins provided with special membranous receptacles, called sinuses, into which the terminal extremities enter and in which a similar discharge and reception of blood takes place. These tufts of the placental veins, and sinuses of the uterine veins, constitute a sort of medium or intermediate arrangement between the arteries and veins, by which the utero-placental circulation is established, without the usual anastomosis that is necessary for carrying on the ordinary capillary circulation. No doubt the student will pause here, and inquire of himself, how can these minute vessels, one set of which comes from the uterus, and the other from the placenta, meet in such intimate relationship, without penetrating the inter-utero-membranule, which separates

the two structures, and which has been said to be imperforate? Instead of penetrating the membranule, called by some, "the cellular decidua," they push it before them, converting it into a sheath or envelope, into the tufts and sinuses, bearing the same relation to the vessels, that the peritoneum bears to the viscera. "Such is the relation of the blood-vessels of the foetal placenta to those of the mother, according to the observations of Drs. J. Reid, Weber and Goodsir."* But Dr. J. Dalton, late of New York, holds the opposite view, he says: "If the placenta be now detached and examined separately, it will be found to present upon its uterine surface a number of openings, which are extremely oblique in their position, and which are accordingly bounded on one side by a very thin, projecting, crescentic edge. These are the orifices of the uterine vessels, passing into the placenta, and torn off at their necks, as above described; and by carefully following them with a probe and scissors, they are found to lead at once into extensive empty cavities (the placental sinuses) situated between the foetal tufts. We have already shown that these cavities are filled during life with the maternal blood; and that there is every reason to believe that before delivery, and while the circulation is going on, the placenta is at least twice as large as after it has been detached and expelled from the uterus." From the above it appears he has been more fortunate in his researches, than any of his predecessors or contemporaries in detecting the perforations of the utero-placental decidua or membranule.

After the rudiments of the placenta become developed, its growth and consistency increases more rapidly than before.

Upon the ovum entering the uterus, the decidua is pushed forward, making bold, round turns; but as the ovum increases in size these turns become less and less, or sharper and sharper, until the two layers at these points come in contact upon the placenta acquiring a due degree of firmness and a certain size, these sharp, edge-like turns unite with it, enclosing its entire circumference, and at term the two structures are so firmly adherent, as to be inseparable without lacerating the decidua.

By referring to Fig. 47, it will be seen where the allantois come in contact with the chorion, the villi, at 6, are more numerous,

* Todd and Bowman.

longer and larger than on any other part of its external surface; these villi, it has already been stated, constitute the first rudiments of the placenta. It will be observed that this beginning of the placental development is on the outside of the chorion, which constitutes it the outside covering of the foetal surface of the placenta, while the amnios reflecting over it, forms the inside covering, thus we have the two membranes forming the linings of the inner or foetal surface of the organ.

Its Attachment. No part of the uterine surface is free from the liability of being the point of attachment of the placenta. It may be attached to either the front or back part of the body, up in the fundus, or over the cervix. In a very large majority of cases it effects its attachment at the point of entrance into the uterus, which is over and around the opening of the Fallopian tube. Where there is a deviation from this usual occurrence, it is where the contact between the decidua and the uterine surface is so slight that their separation is easily effected. In this case the ovum either ascends or descends, according to the least amount of resistance encountered; if this be above the orifice of the tube, it will ascend to the fundus, if below it, its descent will be to the body or neck. The point of attachment first in frequency is about the orifice of the tube; second, is on the anterior surface of the cavity of the body; third, the posterior face; fourth, the fundus, and fifth, the least frequent of all, is over the neck; when this occurs, it constitutes what is termed *placenta prævia*, and is always the cause of unavoidable hemorrhage.

It frequently occurs that there are calcareous deposits found in the substance of the placenta, especially in the neighborhood of the insertion of the cord. And cases are recorded where a considerable amount of ossification has been observed in the organ at the time of birth.

The mode of the placental attachment is susceptible, and has been made the subject of various comparisons; it has been likened unto the roots of a shrub or tree implanted in the ground; to the attachment of the pulp of a peach to the stone; to a seal in soft wax; to the adhesion of a leech to the skin, etc., etc. The real state of the case is this: the placenta lies in the most intimate contact with the spongy, hypertrophied portion of the uterus; the cotyledons impressing themselves into corresponding

cavities in the uterine substance, and the sulci between them are so compressed, as to be almost inappreciable, except the broad superficial depressions, which receive corresponding elevations of the soft, malleable structure of the uterus; thus the two structures present the appearance of being moulded together, with the thin, delicate membranule between them, to prevent their entire adhesion. The contact is maintained between them, similar to that maintained between two bodies by atmospheric pressure. May the pressure afforded by the presence of the foetus and the liquor amnii be sufficient to preserve this contact, and retain the placenta *in situ*?

Dr. John Dalton attributes more importance to the placenta than we recollect having seen ascribed to it by any other author. He says: "The part which this organ takes in the development of the foetus, is an exceedingly important one. From the date of its formation, at about the fourth month, it constitutes the only channel through which nourishment is conveyed from the mother to the foetus. The nutritious materials, which circulate in abundance in the blood of the maternal sinuses, pass through the intervening membrane by endosmosis, and enter the blood of the foetus. The healthy or injurious regimen, to which the mother is subjected, will, accordingly, exert an almost immediate influence upon the child. Even medical substances, taken by the mother, and absorbed into her circulation, may readily transude through the placental vessels; and they have been known in this way to exert a specific effect upon the foetal organization."*

The placenta is, furthermore, an organ of exhalation as well as absorption. The excrementitious substances, produced in the circulation of the foetus, are, undoubtedly, in a great measure, disposed of by transudation through the walls of the placental vessels, to be afterwards discharged by the excretory organs of the mother. The system of the mother may therefore be affected in this manner by influences derived from the foetus. It has been remarked more than once, in the lower animals, that when the female has two successive litters of young by different males, the

* I have known an acute disease, as Erysipelas, to be communicated from the mother to the foetus in utero, at seven months.

young of the second litter will sometimes bear marks resembling those of the first male. In these instances, the peculiar influence which produces the external mark, must have been transmitted by the first male directly from the foetus to the mother."*

"It is also through the placental circulation that those disturbing effects are produced upon the nutrition of the foetus, which result from sudden shocks or injuries inflicted upon the mother. There is now little room for doubt that various deformities and deficiencies of the foetus, conformably to popular belief, do really originate, in certain cases, from nervous impressions, such as disgust, fear or anger, experienced by the mother. The mode in which these effects may be produced is readily understood from what has been said above, of the anatomy and functions of the placenta. We know very well how easily nervous impressions will disturb the circulation in the brain, the face, the lungs, etc.; and the uterine circulation is quite as easily influenced by similar causes, as physicians see every day in cases of amenorrhœa, menorrhagia, etc. If a nervous shock may excite premature contraction in the muscular fibres of the pregnant uterus and produce abortion, as not unfrequently happens, it is certainly capable of disturbing the course of the circulation through the same organ. But the foetal circulation is dependent, to a great extent, on the maternal. Since the two sets of vessels are so closely entwined in the placenta, and since the foetal blood has here much the same relation to the maternal, that the blood in the pulmonary capillaries has to the air in the air-vesicles, it will be liable to derangement from similar causes. If the circulation of air through the pulmonary tubes be suspended, that of the blood through the general capillaries is disturbed also. In the same way, whatever arrests or disturbs the circulation through the vessels of the maternal uterus, must necessarily be liable to interfere with that of the foetal capillaries forming part of the placenta. And lastly, as the nutrition of the foetus is provided for wholly by the placenta, it will, of course, suffer immediately from any such disturbance of the placental circulation. These effects may be manifested either in the general atrophy and death of the foetus; or, if the dis-

* This conclusion may be considered far-fetched; and the lecherous slut be charged with suspicion of a second act of lewdness.

turbing cause be slight, in the atrophy, or imperfect development of particular parts, just as in the adult, a morbid cause operating through the entire system, may be first or even exclusively manifested in some particular organ, which is more sensitive to its influence than other parts."

The placenta must accordingly be regarded as an organ which performs, during intro-uterine life, offices similar to those of the lungs and the intestine after birth. It absorbs nourishment, renovates the blood, and discharges, by exhalation, various excretitious matters which originate in the processes of foetal nutrition."

6. *Of the Funiculus Umbilicalis, Umbilical cord or Funis.* The student while studying the development of the fecundated ovum, must have become familiar with the rudimental development of the umbilical cord. The first element of which is the pedicle of the umbilical vesicle, and the omphalo-mesenteric vessels. Then, after the embryo becomes separated from the blastodermic membrane, the allantois, in the shape of a small tubercle, is seen to start from near the caudal extremity, the very rapid growth of which soon carries the vesicle to the chorion, leaving it attached to the point of its origin in the ventral cavity, by a long, slender pedicle, along which traverse the two umbilical arteries. After the placenta arrives at a certain degree of development, the minute branches of the umbilical vein are formed, and commence running into one another, until they converge into one trunk, which is called the umbilical vein, which takes its place, usually, between the two arteries, in the formation of the cord. As soon as the evolution of these three vessels is complete, which is very early in pregnancy, the allantois disappears by being merged into the placenta, cord and uraeus, the latter extending from the umbilicus to the fundus of the bladder, where it may be seen at any period of life. Until the latter part of the second month, a portion of the intestinal mass may be seen within the cord at its foetal extremity, by which it is at this point considerably enlarged; about this time it recedes within the abdomen. After the utero-placental circulation becomes pretty well established, there being no further use for the umbilical vesicle, it and its stem become obliterated. This occurs about the time the distinctive character

of the allantois disappears. The amnios having previously closed in upon the cord, forming its sheath. At three months, the cord, as well as the foetus, has passed through the rudimental state of existence, and now becomes amenable to the laws of growth only. At this time, as at birth, the cord consists of two arteries and one vein enclosed in an amnionic sheath. In some rare anomalous cases there are two veins, and still more rarely only one artery has been observed. Cases are recorded of three arteries and no vein ; and others of three veins and no arteries.

The Funiculus Umbilicalis, (from *funis*, "a cord,") is the connecting medium between the placenta and the umbilicus of the foetus, and it is through its vessels that the placento-foetal circulation is carried on. The oxygenated *arterial* blood of the mother is transmitted to the foetus through the umbilical *vein*, while the impure or *venous* blood of the foetus is carried to the placenta by the umbilical arteries. Herein the functions of these vessels differ from those of the arteries and veins in general. It is the office of the former to transmit throughout the system, the oxygenated or purified blood, while the latter collects the impure or carbonated blood, and carries it to the heart; the pulmonary, portal, and perhaps the renal circulation, affording exceptions to the rule. The umbilical vein differs from the veins in general, in the absence of all valvular arrangement.

The length of the cord is very variable, it has been estimated to equal that of the foetus at birth, as well as at every period of pregnancy, after its evolution ; while this estimate approximates the truth, it is by no means uniform in its occurrence, there is as often a difference of from one to three or more inches, as there is an equality in the lengths of the foetus and cord. While the average length is from sixteen to twenty-two inches, it sometimes deviates from this standard in opposite extremes. A few years ago we delivered a woman, in which case there was a very large battle-dore placenta connected to the child by a cord not more than ten inches in length. Others have reported them as low as eight, six, and even two inches long ; on the contrary, they have been represented as being of two, three, four, and even six feet in length. On the 19th of June, 1865, we delivered a lady, with forceps, in which instance the cord measured forty-eight inches between the

abdominal and placental surfaces. The child perished from a premature descent of the cord, which occurred early in the labor. The case,—a very complicated one,—is reported in the University Medical and Surgical Journal of September, 1865.

The thickness of the cord is not uniformly the same, in every instance, nor at its different parts. In addition to the two arteries, one vein, and their amniotic investments, it contains more or less cellular or connecting tissue, and a transparent gelatinous substance, known as *Warthon's gelatine*, by which the vessels are surrounded. This substance abounds more plenteously in some specimens than others. Where it is in excess, the cord is correspondingly thick, and is called a *fat* cord, and where it is deficient, it is proportionately thin, and is denominated a *lean* cord. One portion of the cord may be fat, and the remaining portions lean; this may occur at one, or the other end, while the remaining part remains thin and lank. The end most frequently enlarged is that attached to the foetus, which makes it more highly necessary, that care should be observed in the application of the ligature, previous to dividing it at the time of birth, lest the vessels do not become sufficiently compressed, and hemorrhage supervene.

The Nodosities of the Cord. The smoothness and uniformity of the surface of the cord is interrupted by nodes or knots throughout its entire length, and at greater or less distances apart; sometimes they are few and sometimes more numerous. It occasionally happens that there are but one or two to be seen. They consist of doublings in either the arteries or vein. It has been considered that the vein is more frequently involved in their production than the arteries. In this, however, Velpeau and Hoboken hold a different opinion; they aver that they are produced more frequently by the arteries. Sometimes they are real knots, but usually nothing more than mere vascular doublings or nooses, the same as occur in varicose veins of the lower extremities and other parts of the body. Superstition has attached more importance to them than they deserve. Avicenna, the Chorasonian philosopher, who flourished in the tenth century, taught that the number of these nodes indicated the future fruitfulness of the woman, and their distance apart was indicative of the length of time that would elapse between the subsequent births. Rhodion, another of the

ancient savans, inculcated the same absurdity, and it has been transmitted from one generation to another until the present time; and every accoucheur, who is experienced in the gossip of the lying-in room, is familiar with the sage looks and self-importance that accompany the prophetic enunciations of some pious aunty or venerable grandmother, as she adjusts her spectacles, and reads from the mystic string the future virility or sterility of the wearied and exhausted patient. They really are of but little consequence; but Velpeau says of them: "Although they have never been accused of interfering with the omphalo-placental circulation, it may nevertheless be concluded, that if very numerous and close, and presenting very acute angles, these turnings might be the means of obstructing to a greater or less degree the flow of the blood in its proper vessels."

The Spiral Arrangement of the Vessels of the Cord. About the middle of the second month, there commences a spiral arrangement of the vessels of the cord, which continues to characterize it throughout the whole remaining months of pregnancy. It consists in the two arteries entwining themselves around the vein in a spiral direction. It sometimes occurs that all three of the vessels twist themselves around a common centre. Cazeaux observes, that in nine times out of ten they twist from the left to the right. Various attempts have been made to account for this peculiar arrangement of the vessels of the cord, but all of them are liable to objections; and none of them satisfactorily solve the problem. Velpeau says: "The reason of this twisted appearance seems to me to be very plain; it depends on the rotary movements of the child in the womb," and Cazeaux favors this view, which would have considerable weight were a simultaneous twisting of all the vessels and the sheath a uniform occurrence; but as the rule is for the two arteries to twist around the vein, and the above the exception, its validity is very questionable; the rotations of the embryo would not cause the tortions of two vessels, and allow the other and the sheath to remain unaffected. It is impossible to fasten a cord, composed of three strands, at one end and turn or twist the other in one direction without involving all the strands in the operation. Such is the case with the umbilical cord. It is stationary at the placental extremity, and composed of three .

strands or parts, together with the sheath. Now, even admitting the rotations, (which is extremely doubtful, in view of the great frequency of the first vertex presentation in labor,) of the foetus, no skill or management could be exercised, no law of mechanics executed, that could produce the result we every day witness, viz.: one untwisted and two twisted strands, and the straight untwisted envelope. And again, in some instances the cord appears to be twisted, at one end, in one direction, and at the other in the opposite one. The rotations of the foetus would not account for this double action. Sometimes, though rarely, the arteries remain straight and the vein is coiled around them. The rotation of the foetus does not account for this deviation. Haller thinks, "these contortions seem to result from a more rapid growth of the vessels within the sheath, than of the sheath itself." What the object of this spiral arrangement may be we shall not pretend to determine, nor whether there is an object in view or not; but the effect evidently is to modify the omphalo-placental circulation, and present an excessively rapid passage of the blood through the vessels.

Valves of the Umbilical Vein. Some anatomists, as Hoboken, Reuse and others, have taught that this vein, in common with the other veins, contain valves. Their existence is denied by others equally distinguished. Some aver that they have been found in the arteries also; but more recent observations have failed to confirm these assertions in regard to either. Their existence, therefore, in the umbilical vein is extremely doubtful.

The point of Attachment of Foetal end of the Cord. At the earliest period of the development of the cord it is found inserted but a very short distance above the genitals; but as the evolutions of the embryo proceed it recedes farther and farther from this point, until at term, it is found rather below the middle of the child. At *two months*, it is inserted quite low down in the belly. At *ten weeks*, it is somewhat farther removed from its original point of insertion. At *the fourth month*, it is inserted higher up in the abdomen, at a point about an inch and a half below its centre. At *six months*, the middle of the length of the foetus, i. e., at the lower extremity of the sternum, and the cord is inserted about half way between that and the pubes. At *seven*

months, the middle of the length is below the end of the sternum, but nearer that point than the navel. The cord is inserted near the middle of the abdomen. In fact, after the fourth month the insertion of the cord is not far distant from the middle of the abdomen, but much below the middle of the length of the fœtus. At term, it has been said that the navel was the middle point between the crown of the head and the soles of the feet; but this is not correct, as a general thing, for, "from the researches of M. Monroe, communicated to the Academy of Medicine, it appears that in *ninety-four* children born at nine months, *four* only had the umbilicus in the middle of the body, while in *ninety* others it was below this. The *mean* of the variation was nearly *one inch*. M. Ollivier de Angles has also observed the same thing in thirty children examined by him."*

Among the other means of diagnosis, the point of insertion of the umbilical cord, at the various periods of gestation, is important in a medico-legal point of view. There are a few anomalous cases recorded of the cord being inserted elsewhere than in the abdomen: as the breast, cranium, neck, limbs, etc.

The Division of the Cord. The vessels of the cord sometimes branch off before it reaches the surface of the placenta, and penetrate its substance at different points. It may divide one, two, three or more inches from the placental surface, and into two or a greater number of branches. These are anomalous cases, and of very rare occurrence.

7. Of the Umbilical Vesicle. It will be remembered, that while studying the development of the fecundated ovum, it was demonstrated that the blastodermic vesicle is produced through the disintegration and ultimate degeneration of the vitellus, or yolk, and that the blastodermic membrane, which constitutes the walls of the vesicle, consists of two layers, the external or serous and the internal or mucous. That the first traces of the embryo, which consists of an aggregation of cells, are seen on some point of the vesicle, called the embryonic spot. This gradually increases in size, and assumes the shape and functions of an organized embryo. That part of the vesicle not immediately implicated in the evolu-

* Cazeaux, page 203.

tion of the embryo, now takes the name of the umbilical vesicle, *vide* Fig. 41, 3. In Fig. 43, we see the primitive rudiments of the embryonic circulations in the evolution of the omphalo-mesenteric artery and vein. These vessels are contained in that portion of the stem of the umbilical vesicle, that remains within the cavity of the abdomen of the embryo. They constitute the beginning of the enteric circulatory system. During the first three weeks of gestation, the umbilical vesicle is about the size of an ordinary pea; at four weeks it begins to diminish in size, and about the fourth month it disappears altogether. It contains a yellowish fluid, and in process of the ovum, it is found between the chorion and amnion, and has a very long slender pedicle, which enters into the original formation of the cord, as represented in Fig. 55, 5.

The fluid contained in the umbilical vesicle is thought to afford nourishment to the embryo, during the earlier weeks of its existence.

8. *Of the Allantois.* From what has already been said of the allantois, the student cannot but be familiar with this organ and its functions. At about the tenth day it is observed to spring from the caudal extremity of the embryo, as represented by 7, Fig. 44. It is of very rapid growth, and of short duration. It consists of a vesicle, containing a fluid, and at full growth, a long slender pedicle, which terminates in the cloaca or cisti-intestinal vesicle of the embryo. Its principal functions is to convey the umbilical arteries to the chorion, where their minute terminal branches enter the villi of that membrane, and commence the formation of the placenta, in the manner already described, 2, 2, Fig. 47. After the omphalo-placental circulation becomes established, the allantois disappears, partly by being merged into the placenta, and partly by atrophy and absorption. The umbilical vein, after traversing the pedicle of the allantois, passes from the umbilicus to the liver of the embryo. The existence of the allantois is of but a few days duration.

SECTION III.—OF THE MODIFICATION OF THE UTERUS.

The modifications produced by pregnancy are extensive and numerous, involving the size, shape, and position of the uterus, as well as the structures constituting the os cervix body and fundus.

Size. It has already been stated that in the virgin state at maturity the uterus is about two and a half inches in length from the fundus to the os, and about one inch and a quarter wide at its broadest part, and from a half to three-quarters of an inch in thickness antero-posteriorly, and its weight is from eight to twelve drachms.

As soon as conception takes place, an augmentation in the size of the uterus commences, and continues until the end of pregnancy. As the increase in the size of the embryo is slower, during the first three months of gestation, than it is subsequently, so also is that of the uterus. After this time its growth is much more rapid, but it is at all times when in a normal condition, in harmony with the growth of the foetus within its cavity. At the third month the uterus measures about *two inches and three-quarters* in each of its diameters, viz.: the vertical, from fundus to os, the transverse, and the antero-posterior. At the fourth month, these diameters are *three inches and three-quarters*. At six

months the vertical diameter is *eight and three-quarter inches*, and the transverse and antero-posterior each *six and a quarter inches*. And at the ninth month, the vertical diameter is from *twelve and a half to fourteen and a half inches*, the transverse *nine and a half*, and the antero-posterior from *eight and three quarters to nine and a quarter inches*. These measurements are according to the French estimates, and may be a grade lower than in the generality of cases in the United States,

FIG. 57.



REPRESENTING THE RELATIVE DIAMETERS OF THE UTERUS AT TERM.

where new-born infants are uniformly larger than in the former country.

Shape. The shape of the unimpregnated uterus is comparable to a flattened gourd or pear. It soon becomes more globular and from about the second to the sixth month, the body presents a spheroidal figure, with a prolongation in one direction, which constitutes the neck. At this period the posterior face begins to flatten, to accommodate itself to the spinal column, while the anterior portion becomes correspondingly convex. From this period to the time of delivery, the greater length of the vertical diameter gives the organ somewhat of an oval shape.

Position. The position of the unimpregnated uterus is in the centre of the pelvis. During the first three months of pregnancy it settles down further, which causes the os to approach nearer the vulva. This first change of position is induced by the increased weight of the organ. As its size increases, the pelvic cavity becomes too small to contain it, the fundus then rises above the brim, and about the fourth month the entire body raises above the superior strait, the os uteri accordingly recedes from its near proximity to the vulva, and can be found only at the upper part of the pelvis. As the uterus continues to increase in size, and to ascend still higher into the abdomen, the os also rises higher, so that it can be reached by the finger with some difficulty. In consequence of the body and fundus of the organ inclining to the right, the os will be found rather to the left of the median line of the pelvis; and as the abdominal muscles afford less resistance to the enlarging uterus than the spinal column, the body and fundus incline forward, the os looking downwards and backwards. Hence, after four and a half months, the os uteri will be found situated in front of the promontory of the sacrum, and a little to the left.

A familiarity with the different points of the abdomen the fundus occupies, at the different periods of gestation, will assist materially in arriving at a correct diagnosis, in regard to the various stages of pregnancy.

At the fourth month the round, firm figure of the fundus will be felt about one inch above the pubis; at five months it is on a level with the umbilicus; at six months it is traced about two inches above the umbilicus; at seven months it is half way between the umbilicus and the ensiform cartilage; at eight months it is at the

lower margin of the scrofula cordis; and at eight months and a half it has reached its highest ascent, which is near the ensiform cartilage. At about this period the uterus settles down in the pelvis, so that at nine months the fundus is no higher than at eight months and a half; and the os descends again below the brim. Dr. Harris' remark that "the fundus does not rise as high as the umbilicus until the end of the *sixth* month of gestation," does not agree with the repeated observations made by myself and others.

That there are deviations from the relative positions of the fundus, as above stated, will not be disputed; but in a very large majority of cases they will be found to accord with the experience of most observers. Sometimes, when the woman has been many times pregnant, and born many children, the anterior abdominal muscles become very much relaxed, favoring an extreme anterior obliquity of the uterus during the latter weeks of pregnancy, in which case the os is carried above the vertebro-sacral angle, entirely out of reach. In such cases the abdomen requires to be supported by a sort of suspensory bandage, made to operate from the shoulders. During the latter part of gestation the fundus and body sometimes inclines more to one side or the other, which is termed right or left obliquity as the case may be; the os uteri being found on the opposite side. In a very large majority of cases the uterus is found inclining to the right side; various hypotheses have been offered in explanation of this circumstance. Levert teaches that the uterus is inclined to the side to which the placenta is attached, and that this is far more frequently on the right; that the additional weight given to that side by the placenta inclines the organ in that direction. In opposition to this it is averred, that the placenta is not, by any means, always attached to the side to which the uterus is inclined. (Cazeaux.) Desormeaux holds that it is pushed to the right, as it rises out of the pelvis, by the iliac portion of the colon, which is usually filled with faecal matter. Dubois combats this opinion by stating that any influence the colon, placed on the left, may have, is fully compensated by the presence of the cœcum on the right. The more common use of the right arm, and the more frequent lying on the right side, have been urged as reasons for the more frequent right inclina-

tion. Actual observation has proved the fallacy of this hypothesis. Madame Boivin, as has been stated elsewhere, attributes it to the fact of the round ligament of the right side being shorter, stouter, more muscular and more powerful than that of the left. Curveilhier opposes this reason, by alleging that the shortness of the round ligament of the right side is the effect and not the cause of the right obliquity, and says he has observed the same thing in regard to the left round ligament, in cases of the left obliquity. Velpcau, Cazeaux, and many authors of great merit and distinction, favor the view advanced by Madame Boivin.

In this controversy of opinions we should not lose sight of one, at least, of the most probable causes of this frequent right obliquity, viz.: the position of the rectum in the pelvis, which viscus, as has been already remarked, passes down a little to the left of the median line, crowding the uterus, as it becomes enlarged, over to the right side, where it is retained, by the same cause, during its ascent to the abdomen, in which operation it may derive some aid from the action of the round ligament of that side.

1. *Modifications in the Structures of the Os and Cervix Uteri.* The positions of the os uteri, at the different periods of pregnancy and in the various positions of the gravid uterus, have already been noticed. The os and cervix of the gravid uterus, when compared with that of the unimpregnated organ, present some very important and interesting structural modifications.

Formerly the universally received opinions of writers on obstetrics, including those of the first third of the present century, was that the softening or ramollescence of the cervix uteri commenced at the os internum; that this point of the neck was the first to yield to the mollifying influence of advanced gestation; the opposite of which is now known to be the truth.

Immediately upon the occurrence of pregnancy there is no perceptible change manifested in the os or cervix; but after a few weeks the mucous membrane, covering the os uteri, is discovered to be somewhat swollen and puffy, or in other words, softer than usual; at this time the change is confined to the structure mentioned, for by pressing upon it moderately, with the finger, the firm, dense tissue of the lips can be readily distinguished. This softening process continues gradually, so that at the end of the

third month it involves the whole of both lips and is from a line to a line and a half thick. The ramollescent process continues to advance slowly but steadily, and at the beginning of the six month a considerable portion of the neck below the insertion of the vagina is found to have undergone a like change. From the sixth to near the ninth month the remaining or upper portion of the neck, in like manner, yields to the change, until at last the os internum only remains unaffected, and can be felt, like a firm ring, dividing the soft neck, (which now in women who have borne several children previously, readily admits the end of the finger into its cavity,) from the presenting part of the foetus. This finally gives way and the entire neck is as soft and flexible as the vaginal walls themselves; and those inexperienced in touching are often perplexed in trying to distinguish between the two structures. The student will observe that the advancing change in the cervix, from the os upwards, indicates the corresponding advanced state of pregnancy, and serves as a valuable adjunct to the positions of the uterus, in ascertaining the different periods of gestation.

Cazeaux observes: "That whenever females have had a great number of children, the sub-vaginal portion of the neck loses the greater part of its length; for the extremity projecting into the vagina (which corresponds to the middle part of the neck in the first and second pregnancy) does not soften until the period at which it would have undergone this ramollessemens, if the neck had preserved its primitive length; whence we may expect to find a great difference in the extent of the softened part, if a comparison be made between the necks of two females, both advanced to the sixth month, one of whom is enciente for the second time and the other had previously borne ten children. Wherefore it is necessary, in making this appreciation, to bear in mind the number of former pregnancies, as also the real length of the cervix."

Of the Shape of Cervix Uteri. As has been stated heretofore, the most pendent part of the neck of the uterus is found inferior to the insertion of the vagina. The difference in the appearance and character of this portion, between the virgin state and one that has borne children, has also been noticed. In the former condition, the inferior portion of the neck, in the living subject, appears to extend down into the vaginal cavity, from a half to

three-quarters of an inch, called the intro-vaginal portion, around which the finger can pass freely (Fig. 58). It is a firm, smooth structure, in the centre of the lowest surface. The os may be distinguished, by a small oval depression, with its long diameter running in the direction of the transverse diameter of the pelvis.

In a woman who has borne children a very different condition of things is presented. Here the intro-vaginal portion, instead of presenting a uniformly smooth oval termination, with a mere central depression, is strongly marked by two prominent lips and a deep transverse fissure between them. The anterior lip is short and chubby, with the anterior wall of the vagina inserted about two lines above its lower border; while the posterior one appears like a prolongation of its structure, into the substance of the posterior vaginal wall, giving it the appearance of a very long lip. This arrangement prevents the finger encircling the entire neck, as in the former case. The anterior lip can be encircled, and the course of the vaginal insertion traced, but not so with the posterior. In cases of prolapsus, where the body of the organ sinks down, the entire lower portion of the neck may present. In this instance, the posterior lip makes a fold upon itself, leaving a sort of cul-de-sac above.

In the early part of the first pregnancy, say about the second month, a very decided change takes place in the shape of the intro-vaginal portion of the cervix. It becomes prolonged from a half or three-quarters of an inch to an inch or inch and a half, and I think I may safely say I have examined it on several occasions when I could survey two inches between the insertion of the vagina above and its terminal point below. This observation is fully sustained by the researches of Madame Boivin, and more recently by M. Filugelli, who asserts that he has known instances of its attaining the length of two inches and three-quarters, and even three inches. Agreeably to Cazeaux's estimation, these opinions result from error. He says: "The neck, in the commencement, being much lower, and directed more in front than in

FIG. 58.



STATE OF THE NECK AT THREE MONTHS.

the ordinary condition, the finger can readily explore a larger extent of it, and thus an impression is created of an increase in its length, which does not really exist; for frequent post-mortem examinations of females who died in the early months of pregnancy, have convinced me that, even if the neck is increased in thickness, its length does not undergo an appreciable augmentation up to the fifth month." The reader will observe that it is the *living subject* we are speaking of, and not the tenant of the *dead house*. Death works many changes in the appearance of individuals. We would have but a poor appreciation of the fullness, the bloom and beauty of youth, if we were required to draw our inferences from the appearance of the ghastly and shrunken cadaver. The cervix uteri, as well as the countenance and general form, may lose many of its properties by parting with its vital forces.

A careless observer may fall into the error our author suggests, but one searching for truth and really existing conditions, would be very likely to convince himself of the accuracy of his position, before he promulgated it as a fact. By comparing the different points of an object, no matter what its position may be, whether it is on the house-top or in the cellar; whether it be high up in the vagina or lower down, if the object itself be traced from one end to the other, the difficulty of distinguishing its length, whether it is half an inch or two inches, will not be great for one who has capacity enough to distinguish the difference between half an inch and two inches. As regards the matter in question, it is very easy to place the finger at the utero-vaginal junction, and pass it down to the lower extremity of the cervix at the os, and judge the extent of surface traversed by the finger. Moreover I have repeatedly observed a similar increase in the length of the intra-vaginal portion of the cervix, but not to the same extent, one or two days preceding a menstrual epoch, which subsides again immediately after the termination of the period, and my own observations would justify me in the belief that this monthly change is uniform in all unmarried or childless women. In those who have borne many children it is inappreciable, while in mothers of one or two it is slightly apparent. A trifling increase in the length of this part, is also noticeable in the early pregnancy of

those who have borne one or two children, but in each succeeding one after the first, it steadily diminishes, and after six or seven births it is not perceptible.

In the first pregnancy a further modification in the shape of the cervix takes place. Instead of its being cone-shaped, with its base above and apex below, it assumes a spindle form, from the body of the uterus down, but is most apparent in the intro-vaginal portion which is drawn out nearly to a point, only affording space enough at its inferior terminal point for the os, which is now changed from a transverse oval to a small round opening. These latter modifications of the cervix and os are recognized only in the first pregnancies, and so early as to be amongst the very first diagnostic marks, after the suppression of the catamenia, and are of great service in determining whether the woman is *enciente* or not.

Between the fifth and sixth months it was formerly said the neck, at its upper part begins to spread out, so as to afford greater amplitude to the body, which appears to diminish its length from above. This expansion continues, so far as permitted by the rigidity of the internal os, which consists at the approach of the ninth month, of a mere ring separating the membranes within the cavity from the softened neck below. By this time the cervix is apparently materially shortened, but in reality it is but very little affected, and what difference there is, is due more to the lower portion of the body, which is continuous with the neck at the junction of the two portions, than to any change in the upper part of the latter. (Fig. 59.)

It was taught by Desormeaux, and adopted by most of the French accoucheurs, as the basis of the diagnosis of the different periods of pregnancy, that "the neck lost at the fifth month about one-third of its length, one-half at the sixth, two-thirds or three-quarters in the seventh, three-fourths or four-fifths in the eighth, and the remainder is effaced during the course of the ninth month." "And yet," says Cazeaux, "I do not hesitate

FIG. 59.



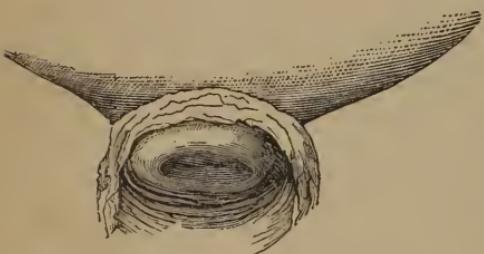
STATE OF THE NECK AT SIX MONTHS.

to pronounce all this an entire error, which was first pointed out by M. Stoltz, in 1826, and to which I have constantly asked attention since the year 1839."

Though, in cases of the first pregnancy, the external os does not dilate in proportion to the extent of the softening process, but remains pretty tightly closed, until it is made to yield to the action of the uterus at the time of labor, that of those who have previously become mothers usually commences dilating simultaneously with the ramollescence of the cervix.

Between the sixth and seventh months, the length of the neck in primiparæ begins to decrease, while its circumference proportionally increases, so that at near the nine months, before the os internum softens and dilates, the neck is not more than an inch and a quarter long, and about an inch in diameter, its greatest thickness is in the middle, but from an enlargement of its inferior

FIG. 60.



STATE OF THE NECK AT NINE MONTHS.

part, it has lost much of its spindle-like form. (Fig. 60.) I cannot unite with Cazeaux in the opinion that this increase of diameter, and corresponding shortening of the neck, result from an accumulation of secretions in its cavity, by which it is distended latterly, causing the two ends

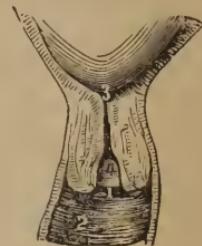
to approximate each other; but would rather refer the compound action to an imperceptible contraction of the longitudinal muscular fibres of the cervix; similar to those painless contractions that take place in the uterus, after the giving way of the internal os, which diminish the uterine bulk, and constitute the preparatory stage, and preludes active labor. As the process of ramollescence, which is nothing more nor less than a preparation for the full dilatation of the os and final exit of the foetus, commences at the inferior portion of the neck and progresses upwards. So, also, in obedience to the same physiological law, the contractile action may reasonably be supposed, in a painless and insensible manner, to commence in the same part, and the shortening and thickening of the neck, just at the time preparatory action is needed, seem to be conclusive that such is the cause of this change in its shape.

In multiparae it has been stated the neck is not so long nor spindle-shaped as in primipara, during early pregnancy, but in the latter weeks there is a corresponding diminution in the length and increase in the circumference of the cervix; and as the os externum dilates, (1, Fig. 61,) as the softening process proceeds, it cannot be urged that these changes result from an accumulation of secretions in its cavity, for they would escape as they became eliminated.

This figure also represents the cavity of the cervix, 4. And the space between it and the os internum, 3, is that portion that has not yet become soft.

The dilatation of the os externum, and the expansion of the cavity proceed *pari passu* with the ramollescence of the cervix, and from month to month it will be found, upon experiment, that the finger will pass further and further into the cavity—so much so that at the seventh month it will be able to reach the middle point, as represented by Fig. 62, 1. The cavity sometimes presents a conical form and fits the finger like a thimble, at other times it is more a bill-shaped, with the base below. Between the eighth and ninth month, the finger is separated from the membranes by a ring of greater firmness than the surrounding structure, and at the expiration of gestation, or the ninth month, the ring, the last remains of the primitive density of the tissues, succumbs to the irresistible encroachments of the ramollescence, and through the soft and yielding orifice, the finger comes in direct contact with the membranes of the ovum (1, Fig. 63). From this time the neck rapidly expands, and becomes involved in the structures of the lower part of the uterine body, and ultimately obliterated entirely. The only vestige of the neck that now remains, is a simple opening, which finally dilates sufficiently to allow the foetus to escape.

FIG. 61.

STATE OF THE NECK
AT FOUR MONTHS.

- 1, The Os Externum.
- 2, The Vagina.
- 3, The Os Internum.
- 4, The Cavity of the Neck.

FIG. 62.

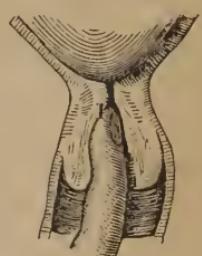
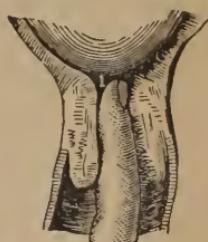
STATE OF THE NECK
AT SEVEN MONTHS.

FIG. 63.

STATE OF THE NECK
AT NINE MONTHS.

2. *Of the Modifications of the Structures of the Uterine Body.*
As the changes in the size, shape, and position of the gravid uterus have been studied, the attention of the student is now called to the changes that are effected in the structure of the organ by impregnation. As we have a combination of the serous, muscular and mucous tissues entering into the composition of the uterine structures, it seems necessary that each of these should receive a share of attention, separately, as preparatory to their consideration collectively.

The Serous Covering of the Uterus, called its peritoneal coat, envelopes the upper third of its anterior face, the fundus, and the entire posterior face of the body and neck. In the non-gravid state, the uterus is estimated by Levret to present a superficies of sixteen square-inches, while at the full term of gestation, he estimates it at three hundred and thirty-nine square-inches. In the first instance, with the exception of the lower portion of the anterior face of the body and neck, the whole of the surface is serous membrane; and a corresponding portion of the three hundred and thirty-nine inches, at the time of parturition, is the same structure. Now, when we compare the extent of serous surface, at the close of gestation, with that presented by the uterus at its commencement, the question naturally presents itself, whence this vast increase? Does it result from an attenuation of the original peritoneal covering of the uterus, or does it arise from an absolute increase of tissue? As regards the former proposition, it falls before the fact that the serous covering of the organ is equally thick at the end of gestation as it is before impregnation; it is evident that it could not be attenuated to that extent without having its thickness impaired in a corresponding degree. It then follows that the great increase of serous covering is due to an equal increase of tissue, to supply which a corresponding augmentation of nutrition, in the uterus, is required.

Some anatomists have maintained that the folds of the peritoneum, connected with the uterus, as the broad ligaments, and the duplicatures found at the *cisto-uterine* and *recto-uterine* attachments, called by some the *anterior* and *posterior ligaments*, are sufficient to supply the increased covering, when the uterus has acquired its greatest dimensions, by being spread out over the

organ ; but such is not the fact, for they would be insufficient to furnish the required supply, even were they thus appropriated ; and their presence, at the last hour of gestation, shows no such use has been made of them. Again, the looseness with which the peritoneum is attached to the uterus at term shows that there is also an increase of cellular tissue, connecting the serous with the muscular structures.

Of the Muscular Structure. The muscular tissue, parenchyma, (from *παρεγγύμα*, *parenchyma*,) which signifies effusion. This word was originally used in reference to structure of glandular organs, as the liver, kidneys, etc., as it was believed this tissue consisted of diffused blood or other fluids. The term continues to be applied to organs other than glandular, as the uterus, lungs, etc., which is evidently a misapplication, and which a proper regard for accuracy of expression ought to discontinue. While studying the anatomy of the ungravid uterus, the student learned that the firm, dense structure that constitutes the substance of the organ, which is found between the investing serous and lining mucous membranes, is essentially muscular, that the muscular fibres, in consequence of the absence of cellular substance, are packed so closely together that the structure possesses a density not found in any other muscular organ. The muscularity of the organ is so much obscured by the peculiar arrangement and extreme fineness of the fibres, that in the virgin state, its demonstration has thus far baffled even the powers of the microscope, and defied the strictest scrutiny of the anatomist. Hence the minute anatomy of this structure continued to be the theme of disputation until the dissections of the gravid organ by Hunter, Bell, Madame Boivin, Velpeau, and others, determined its true character, and assigned it to its proper position amongst the muscular organs of the body.

As this structure can be studied to advantage only under the modifications effected by pregnancy, and as these were given in detail while considering the anatomy of the uterus, the student is referred to that article, from page 103—110, (Figs. 21, 22, 23, 24,) for a full and minute description of the changes produced in the structure of the organ during gestation.

Of the Mucous Lining of the Uterus. The mucous membrane, lining the unimpregnated uterus, is very thin, and, in consequence

of the absence of sub-mucous cellular tissue, it is connected directly with the firm muscular structure, to which it adheres with a tenacity that defies all attempts at a separation. Its extreme tenuity, and the firmness of its adhesion to the sub-mucous structures, have led some anatomists to deny its existence.

In the gravid uterus its presence is abundantly established. Its thickness is greatly increased, and numerous mucous follicles with their tortuous and winding ducts are observable in its substance, and penetrating beneath it. And the presence of a bountiful supply of sub-areolar tissue renders its separation easy.

When we compare the small triangular cavity with a superficies, according to Levret, of only four-fifths of an inch, in the unimpregnated state, to the vast hollow, presented at the close of gestation, with a superficies of four hundred and eight square inches, it is evident that the mucous, as well as the serous structure of the uterus, partakes freely of the increased nutrition enjoyed by this organ during gestation. While there is an almost incredible difference in the size of the uterine cavity, lined with mucous membrane, between the beginning and close of pregnancy, the mensuration of Levret must be accepted with some allowance for excess. He estimates the external superficies at three hundred and thirty-nine inches, and the internal at four hundred and eight. Now it is evident that the interior surface of a hollow body cannot equal in measurement the external; but Levret, in this instance, makes the internal to *exceed* the external by sixty-nine square inches—an oversight quoted by Velpeau, and admitted by his translator, Dr. Meigs.*

* We acknowledge indebtedness to our friend and colleague, Prof. E. D. Buckman, for the following mathematical calculation of the external and internal superficies of the virgin uterus, and of the impregnated organ at term:

The average dimensions of the former being as follows: The length, from fundus to os, $2\frac{1}{2}$ inches. The fundus being elliptical, its long diameter is $1\frac{1}{4}$ inches and its short diameter $\frac{5}{8}$ of an inch. The perimeter of the ellipsis will be found to be 3.13 inches, and of the circular neck 1.96. The two aspects, (anterior and posterior) of the uterus, then each presents a quadrilateral figure whose ends are one-half of the measurements above stated, and whose length is 2.5 inches. The joint surfaces of the three divisions is found to be 6.36 or $6\frac{1}{2}$ square inches; instead of 16 square inches, as stated by Leveret, page 210.

Its cavity consists of two equal triangular surfaces, somewhat cusped, with a base of $\frac{3}{4}$ of an inch, and 1 inch in median length, clear of cuspings. These two faces would complete a rectangle of $\frac{3}{4}$ of an inch by 1 inch, consequently of a superficies of just $\frac{3}{4}$ of an inch; full allowance has been made for the curvature of the cusps. Leveret gives it 4.5 of an inch.

Notwithstanding this discrepancy, the fact of the great increase in the quantity of mucous tissue during gestation remains unaffected. Some anatomists hold that the rugous arrangement or folds of the mucous membrane are sufficient, when spread out, to account for the necessary increase of mucous surface observed at the close of gestation; but an inspection of these, in the cavity of the unimpregnated uterus, will be sufficient to convince any one of their entire inability to furnish the necessary supply. The villi of the mucous membrane manifest an increase of size after impregnation, corresponding to that of the structure, and according to some they become more numerous, and the membrane takes on a more decided redness. In the mucous membrane of the neck are the *glandulæ* or *ovula Nabori*, which enlarge, and, from their increased activity, throw out a peculiar viscid mucous, which blocks up its passage and protects the internal uterine cavity. This has been called the uterine plug.

Early after impregnation, numerous small glands are seen, as elongated wavy tubes, in the mucous membrane, having a tolerably straight course in their more superficial part, but much contorted towards their deep aspect, where they terminate in two or three cecal extremities. There being no cellular tissue in this mucous membrane, the space between these tubes contains capillary vessels and numerous cells, which, by their increase of development and multiplication, produce its greatly increased thickness.

Calculation of the Superficies of the Cavity at term. At this juncture the organ presents a conical cylinder, with hemispherical ends. The larger end being $8\frac{3}{4}$ by $9\frac{1}{2}$ inches, gives a medium diameter of $9\frac{1}{2}$ inches. The smaller end has a diameter of 5 inches, and the space between these two hemispheres, in the central line is $6\frac{1}{2}$ inches, or 7 in the slant side. On these data the superficies and capacity of the uterine cavity are determined as follows: Superficies 325.39 square inches, instead of 408 square inches, according to Leveret. The capacity of the cavity at term, agreeably to the average and accepted measurements is 502.069 cubic inches, equal to 8.68 quarts, wine measure, or 18.160 lb, avoirdupois.

The External Superficies. Estimating the uterine walls at a quarter of an inch in thickness, thereby increasing the diameter one half an inch, its superficial area is found to be 371.22 square inches, instead of 339 according to Leveret.

Summary—Virgin uterus, external superficies $6\frac{1}{4}$ square inches; internal superficies, $\frac{2}{3}$ of a square inch. At term, external superficies, 371.22 square inches; internal superficies, 325.39 square inches.

It is the concurrent opinion of most modern physiologists, based upon observation, that this glandular, and a corresponding vascular modification of the mucous membrane, in very early pregnancy, contribute largely towards the development of the decidua vera; and further, that the latter structure is only an exfoliation of the former in an altered condition, being thickened and hypertrophied to an extraordinary degree.

Having examined the serous, muscular and mucous constituents of the uterus, and their modifications, separately, we are prepared to study them collectively, in connection with the vascular and nervous tissues and their modifications, as presented in the gravid organ.

We have seen that there is an actual increase of tissue in each of the structures examined, which could only result from an increase of nutrition in the uterus; and this increase of nutrition could only result from an increase of blood in the organ, and to provide for this increased flow of blood a corresponding increase in the channels of the circulation is indispensable. Accordingly we find, among the first perceptible changes in the uterus after pregnancy, an enlargement of the ovarian arteries as they approach the organ, while advancing between the peritoneum and its external face, and before giving off their first divisions they become engorged, and then send off branches to the anterior and lateral parts of the body and fundus, which ramify *ad infinitum*. All these ramifications anastomose freely and penetrate through to the internal surface, where they generally terminate; but a large number of those corresponding to the placental insertion traverse the mucous membrane, and, according to M. Jacquemier, enter the inter-utero caducous membrane. The uterine arteries, that are supplied by the hypogastric, which enter the substance of the uterus at the neck, mainly, also enlarge in size and ramify and anastomose freely through the inferior portion of the body and neck.

The venous trunks are also enlarged, and from the point of leaving the uterus to their termination in the hypogastric vein and descending vena cava, a very great enlargement is noticeable; the ovarian and uterine veins are almost as large as the external iliacs. In the substance of the uterus the venous system is represented by

a series of canals, which traverse the uterus in great numbers, coming from all directions, and, anastomosing, form by their union large sinuses, many of them sufficient to receive the end of the little finger. These canals are much larger opposite the insertion of the placenta than elsewhere.

The enlargement of these arteries and veins is due to an actual increase of tissue, similar to that which takes place in the other structures, and not to simple evolution.

The lymphatic vessels also are greatly enlarged in the gravid uterus. They are divided into two groups; those of the neck run to the pelvic ganglia, and those of the body go to the lumbar ganglia. The hypogastric absorbent trunks, according to Cruickshank, are as large as goose-quills, and the vessels themselves so numerous that, when injected with mercury, the uterus appears to be a mass of lymphatic vessels.

The Nerves of the uterus, as has already been stated, are derived mainly: first, from the sacral plexus of the cerebro-spinal system; second, from the great sympathetic, through the hypogastric and spermatic plexuses. Branches from the first and third of these plexuses are accompanied by the arteries, and enter the substance of the organ at the upper part; those of the second, are unaccompanied by arteries, and supply the neck, sides and fundus of the uterus. Thus is the organ supplied with sensor and motor nerves, and those of organic life. In the unimpregnated state the nerves of the uterus, sinuous and undulating in their course, are so extremely small and undeveloped, that, in a healthy condition their functions are scarcely perceptible, but under inflammation, they manifest great activity.

The great compactness in the arrangement of the muscular fibres of the virgin uterus, so far interferes with the growth of both the vascular and nervous tissues of the organ, as almost to deprive it of the use of their functions; hence the white and bloodless appearance of its healthy structure, and the extreme obtuseness of its sensibility, marking a very low degree of organization. But when the muscular structure, under the influence of gestation, begins to lose its density, and take on a looser and softer texture, then the permeating tissues, as the vessels and nerves, having room to expand, begin to manifest functions corresponding to their in-

creased size, the most prominent amongst which, is an augmentation of nutrition throughout the whole organ.

In the gravid uterus, the nerves, in common with all the other constituents of the organ become immensely enlarged, and Dr. Robert Lee, whose dissections and investigations of the nerves of the uterus, have thrown more light upon the subject than the researches of any other anatomist, has described numerous *sub-peritoneal ganglia and plexuses* on the anterior and posterior surfaces of the organ.

The walls of the ungravid uterus, as has already been observed, are from a quarter to three-eighths of an inch thick; from this there is but a very little divergence, if any, at any period of utero-gestation. If there be any difference in their thickness between the commencement and termination of pregnancy, it is in favor of a slight augmentation at the latter period. The volume of the organ does not therefore increase at the expense of the thickness of the walls, like an inflated gum-elastic pouch, as the older writers maintained; but the increased size is due to a corresponding increase of all the tissues composing it. The great amount of cellular substance contained between the enlarged muscular fibres—and which is freely permeated by the vascular and nervous tissues—give a looseness and sponginess to the structure, that are perfectly compatible with the growth and movement of the foetus within, during the latter part of gestation.

While the weight of the virgin uterus is estimated at from eight to twelve drachms, at the close of labor, when emptied of all its contents, that of the organ is estimated at two and a half pounds. From these estimates, a very correct idea can be gained of the extent of the acquired substance during the forty weeks of pregnancy.

After a healthy and natural parturition, nearly all this newly-formed substance is speedily removed by atrophy and absorption, and the uterus returns again almost to its primitive condition, which, however, it never entirely attains during menstruation, and the period of child-bearing in life.

SECTION IV.—CHANGES EFFECTED IN THE UTERINE APPENDAGES BY PREGNANCY.

The broad ligaments, constituted of doublings of the peritoneum, as it comes off from the sides of the uterus, extending from the insertion of the Fallopian tubes at the upper angles (Fig. 25, 4, 4,) to the middle of the neck, along each side; and in the ungravid organ, spread out at near a right angle with its vertical median line, and are lost in the general serous membrane, at the corresponding sides of the pelvis below the brim. These ligaments being, at this time, with the uterus, confined within the lesser pelvis, are carried up by it, as it ascends, during gestation, above the superior strait. And as the Fallopian tubes, the ovaries, ovarian ligaments and round ligaments, are all enclosed between the laminæ of the peritoneum constituting the broad ligaments, and have their attachments to the uterus near its upper angles, they too are removed from their primitive position, and carried above the brim. As the uterus continues to increase in size and ascend higher and higher into the abdomen, these appendages are carried with it, until it reaches its final altitude near the scrofuliculus cordis, about twelve inches, in an ordinary-sized woman, above their original location.

By this time they have lost much of their original appearance and character, and lie closely to the sides of the uterus, with the ovaries and Fallopian tubes, between their laminæ. They do not disappear, however, as averred by Cazcaux.

Now it is evident that this transition of these organs must be attended with an inordinate distension of the broad ligaments, or an increase of structure in the serous membrane adequate to it. As the latter obtains in reference to the peritoneum covering of the uterus, so also is it the case in regard to the broad ligaments. The Fallopian tubes, and ovaries having no pelvic attachments, undergo a much less degree of modification than the structures enveloping them. But the *round ligaments*, having attachments at both extremities, require an increase in their length, to enable them to accompany the uterus in its abdominal ascent.

After parturition the uterus contracts suddenly down again into the pelvis—often reducing its bulk much below one-half its previous size, in a very short time. Now this sudden change in the dimen-

FIG. 64.



This Fig. represents the position of the appendages of the Uterus at term. 1, 1, The Fallopian Tubes. 2, 2, The inferior margin of the Broad Ligaments. 3, The Ovary on the right side. 4, The Os Uteri.

sions and position of the organ, cannot but leave these ligaments, which are its principal support, in an extremely relaxed condition; this, added to the increased weight of the organ at this time, favors in a pre-eminent degree, that unfortunate displacement known as prolapsus uteri, as well as other vicious positions; hence the propriety and necessity of the woman remaining in the recumbent posture, long enough for these parts to regain a degree of tonicity sufficient to protect her against these distressing accidents.

SECTION V.—CHANGES EFFECTED IN PARTS CIRCUMJACENT TO THE UTERUS BY PREGNANCY.

The vagina undergoes considerable modification during the gravidity of the uterus. In the first instance, by the settling down of the uterus, in the early months of pregnancy, the length of the vagina is materially diminished, while the breadth at the upper part is correspondingly increased. Later on, as the uterus ascends above the pelvic brim, it draws the vagina with it,

so that between the fifth and eighth months it is again elongated to the extent of five or six inches; indeed, during this period the length is often so great, that the os uteri, at its upper extremity, can be reached by the finger with great difficulty. During this time the canal assumes rather a cone shape, with its base upwards. Again after the middle of the eighth month, the uterus makes a second descent, which brings the os uteri within easy reach, by again diminishing the length of the vagina.

This second shortening is attended with a much greater increase of breadth than the first. From this time commences a process of relaxation, and an increased secretion of mucus. Now the vulva also becomes enlarged, and the labia hypertrophied and relaxed, with an enlargement of the mucous follicles and an increase of secretions. In fact these follicles may often be felt in great numbers, like small granules, beneath the epithelium, studding the mucous surface of the labia, and the entire cavity of the vagina, towards the approach of labor. The vascularity of the mucous membrane is also much increased from the vulva to the os uteri, imparting to it an unusual fulness and greater depth of color. The vaginal arteries, branches from the internal iliac, are frequently so much enlarged, at the time of labor, that their pulsation can be very distinctly felt at the upper part of the canal, and within and about the os and cervix uteri. This has been termed the *vaginal pulse* by Dr. Osiander, of Gottingen, who regards it of value as a diagnostic sign. 1. *The bladder* being attached to the uterus by two-thirds of its anterior face and the entire neck, is gradually carried above the brim of the pelvis, as that organ enlarges and ascends into the abdomen. This draws the meatus urinarius backwards, so that it can be found behind the inferior margin of the pubis, instead of anterior to it. As the uterus increases and inclines forward, it pushes the bladder before it, causing a curve in the urethra, as it bends around behind the pubis from its inferior edge, to the space it occupies above, and anterior to the upper margin, rendering it difficult to introduce the catheter. The pressure of the lower part of the uterus, upon the neck of the bladder, as it passes up behind the pubis, often produces a tumefaction, and arrests the flow of urine, making the use of the catheter necessary. A flexible instrument, that may be

easily bent to suit the curve of the urethra, is preferable to the one ordinarily employed. Women, as they approach their travail, are often troubled with a sort of tenesmus of the bladder, caused by this compression of its neck, requiring frequent efforts to evacuate it, each effort being attended with only the discharge of a few drops. The demand is repeated again in a short time, and attended with a similar result. This distressing condition continues at longer or shorter intervals, until relieved by parturition.

2. *The External Organs of Generation and Lower Extremities* are sometimes rendered œdematosus, it is alleged, by pressure upon the large lymphatic trunks and blood vessels within the pelvis, which, interfering with the free circulation, causes the fluids to transude through the walls of the vessels into the adjacent areolar tissue. This œdema is usually referred, by authors, to the above cause. It undoubtedly contributes somewhat to its production during the latter weeks of pregnancy, but it often occurs at a very early period, long before the uterus attains an inconvenient size. When it occurs, at an early or later period, it is very probable that it is seldom unconnected with a dropsical diathesis of the system. This is an old-time expression, which means, in this instance, an impoverished condition of the blood, *i. e.*, where there is a deficiency of plasma or the nutritive principle, and an excess of the aqueous portion. This condition of the blood exists from impaired nutrition, resulting from various pathological conditions, and when once present, is incapable, in turn, of supporting perfect nutrition. The system, deprived of its required nutriment, becomes debilitated and relaxed in all its tissues. This relaxation, involving the coats of the blood vessels, favors the exudation of the watery portions of the blood into the surrounding cellular substance; hence the œdema. Now, during pregnancy, the foetus necessarily derives its nutriment from the maternal blood, and where there is a tendency to such a deterioration of this fluid, arising from a known or unknown pathological condition of the system antecedent to, or succeeding conception, the condition of the woman manifestly favors such an occurrence, and contributes largely to the development of the dropsical condition under consideration, deriving some aid, no doubt, from the mechanical pressure to which the vessels about the pelvis are subject, especially during the latter weeks of pregnancy.

Compression of the large vessels within the pelvis is also alleged to be the cause of the *varicose, knotted and broken veins* of the lower extremities, so often met with in pregnant women. That this may assist in aggravating the ailment during the latter months of gestation is granted, but that it is the sole cause of the difficulty is more than doubtful; for an enlargement and painful condition of these veins are, with some women, among the first signs of pregnancy, and become more and more troublesome as gravidity advances. These venous lesions more frequently commence before the sixth month, than after, so that their origin cannot be attributable to uterine compression, as the organ, at this period, is not sufficiently enlarged to produce any such a result. This being the case, it is time for us to abandon impossibilities, and search for a cause within the range of probable events.

Now, in this inquiry, we are able to bring to our aid anatomical relations, physiological structures and pathological facts. The uterus is composed of unstriped muscular fibres; unstriped muscular fibres also enter into the composition of the veins; here we have a similarity of physiological structure. Phlegmasia dolens alba, or that affection peculiar to the puerpural female, known as "Milk Leg," is now acknowledged to be an inflammation of the veins of the leg. It is now an ascertained fact, that phlegmasia dolens has its origin in uterine phlebitis. Dr. Davies, of London, in 1817 was first to enunciate the identity of the two forms of disease; and in 1829 Dr. Lee traced the affected veins to their origin in the uterus, and found the disease equally marked there. In this, he added to Davies' observation his own researches, and proved that crural phlebitis, in many cases, was a continuation of uterine phlebitis. These observations prove the anatomical fact, that the veins of the lower extremities in women are connected, by a continuation of structure, with the veins of the uterus, and the pathological fact, that an inflammation of the former, as in case of "Milk Leg," is a continuation of that of the latter.

Now, as the uterus and the veins of the extremities are so intimately connected, anatomically, physiologically and pathologically, that the morbid conditions of the one are transmitted along the muscular tubes constituting the other, what is there to prevent the relaxation of the uterus, which commences very early in pregnancy,

or there could be no growth and development of the embryo, from proceeding down the veins, as inflammation is known to do? If this be so—and who can doubt the conclusion from the premises—it is easy to account for the enlargement of the veins without the interference of mechanical compression in the pelvis. The knotty appearance they present is due to their valvular arrangement, and the pain and soreness to unusual distension and pressure upon the nervous filaments with which the skin abounds.

This view explains the cause of varicose and ruptured veins in the lower extremities in early pregnancy, which the old hypothesis signally fails to do.

The consideration of modifications of the mamma and umbilicus is reserved, until we come to study the diagnostic signs of pregnancy.

PART FIFTH.

CHAPTER I.

COMPOUND, COMPLICATED, FALSE AND EXTRA UTERINE PREGNANCIES.

COMPOUND PREGNANCY.

COMPOUND pregnancy is where two or more ova, in a state of fecundation, are received in the uterus, and retained and nourished there from conception to parturition.

While a very large majority of natural uterine pregnancies are simple or single, those of a compound character are sufficiently numerous, to claim and receive from the student, at least, a proportional share of attention.

SECTION I.—OF TWINS.

Some women seem to be remarkably prone to compound or plural pregnancies; it is not an extremely rare circumstance for one woman to have twins two, three or more times in succession. There is amongst the people a sort of traditional idea that the tendency to twins descends from mother to daughter, or in other words, that it is amenable to the law of hereditary transmission; and the frequency with which it seems to occur, that some families are more especially blest in this respect than others, would rather justify the entertainment of such a notion than otherwise. Nor is the opinion discredited by some of our best authorities. Dr. Dewees says: "It is thought by many women, that the disposition to double births is hereditary; and some facts within my own knowledge seem to countenance this supposition;

but they are by no means sufficiently numerous, or sufficiently strong, to confirm it. I can say, however, with some safety, that it is in some instances constitutional. I know one female who has had five twins in succession, and had not ever had a single birth. I knew another who had twins three times, but not immediately following each other." Ramsbotham remarks: "It is also a belief that preternatural fecundity is to a certain extent hereditary," and then quotes the above extract from Dewees. He further adds, "It has been observed, indeed, that some seasons appear more prolific than others, as well in the human race as other productions of nature; but whether this is quite accidental, or dependent upon some fixed law, is not easily determined. Denman thinks 'It can scarcely be doubted that there is some relation in those years between the animal and vegetable creation.' Dewees coincides with this remark of Denman, and adds that climate or the state of civilization exert an influence upon the multiplication of the human species; and that where the means of life are more abundant, or more easily procured, the proportion of twins is probably increased." It is presumable upon general principles that whatever contributes to fecundity in any country, will also contribute to the production of twins." Dewees sustains his position by quoting M. Benoiston, who concludes "that wherever existence is easily supported, there will be found an abundance of children, which would seem to procure from the same cause a greater proportion of twins," etc.

Now to the political economist, this speculation would undoubtedly sound quite plausible, but regarded in the light of science it has very much the "ring" of twaddle.

Twins result from the fecundation of two ova; these may both come from one ovary, or they may come one from each. They both may very easily become fecundated at one coitus, or one may become fecundated by one copulative act, and the other by another. Either is possible, either quite probable.*

* There are several cases recorded of twins being born of different colors of the same woman, *i. e.*, one white and the other black, where the women have admitted they received the embraces of white and black men in quick succession. One case is reported by Dr. Dewees, in the Philadelphia Medical Museum, Vol. I., of a woman in Montgomery County, Pa., in the neighborhood of this city, who had a pair of such children, which the Doctor had often seen; and upon her pregnancy becoming known, two men, one white

As regards the abundance of the means of living, contributing to the production of twins, it might be observed that animals that are the best fed and nourished are the most salacious, *i. e.*, the animal system that is the best nourished, (provided it is not excessively or abnormally fat,) matures the ova more promptly and effectually, and the more salacious an animal is the more productive. The well-fed and well-cared-for animal is more fruitful than the hungry and half-starved. The same is equally the case, in regard to the human female. The better her physical condition, all other things being equal, the more promptly and effectually are the ova matured, and as per consequence, the more fruitful she is, and perhaps more liable to double ovulation and fecundation.

Where a plurality of ova escape from the ovary, in a state of maturation, it is scarcely probable that they arrive at maturity at the same instant, nor escape simultaneously, though it is possible. There may be several hours, or a day or two, between the exit of the ova, and as great an interval between the times of their fecundation. There is nothing to prevent the fecundation of the second ovum previously to the development of the decidua. But it is hardly probable that the difference in the times of fecundation can have any influence in controlling that of their birth, as the uterine action necessary for the expulsion of one, would not be likely to subside, while another foetus remained in its cavity though it may not have come to its full time by a few hours, or a day or two. Nevertheless there are instances recorded of several days, and even weeks lapsing between the times of the births of twins. These are to be regarded as anomalies, referable to pathological conditions, rather than the operation of the uniform laws of parturition.

The proportion between twin and single pregnancies, is a matter in regard to which there is a great variety of opinions. It is very difficult to arrange a uniform scale of proportions—as it is evident that there is a great difference, in the number of twin pregnancies at different periods of time. In some years there are more, and

and the other black, left the neighborhood. These cases prove that the ova were fecundated by two copulations.

There are, on the other hand, numerous instances of twin conceptions, that can be referred with a great degree of certainty, to a single coitus. All of which show, that twin pregnancies may result from either one or two connections.

some less, in the same country. And from statistics it appears that some countries are more productive of twins than others. Dr. Gooch says, in England, the proportion is about 1 to 70. Cazeaux has given some statistics, from Churchill, of the accoucheurs of England, France and Germany, with the following results: In England one case of twins occurs to 69 single births, a corrected error in the calculation makes it one to 65. In France one to 110, a corrected error makes it one to 63. In Germany the proportion is given, one to 84.

In the Maternité at Paris, one was met with in 88; in the Maison d'Accouchemens, one in 91. Madame Boivin met with one only in every 132. Bland in London and Boer in Vienna give one in 80. Denman in Middlesex Hospital, one in 95. In the London Practice of Midwifery, one in 48. Conquest estimates it at one in 90.*

Report of the Edinburgh Maternité Hospital, by Dr. Simpson, one in 83. Dublin Lying-in Hospital, by Collins, one in 62.†

In the United States Dr. Dewees estimates the proportion at one to 75; Dr. Arnell also one to 75; Dr. Moore one to 76.‡

The following table exhibits the proportion of twin to single births, and the percentage, in Philadelphia, for five years, beginning January 1st, 1861, and ending December 31st, 1865, inclusive, as prepared from the official reports of the Board of Health, for those years.

Years.	Births.	Twins.	Proportion.	Per centage.	
1861	9,008	162	1 to 56	1.55	
1862	14,741	154	1 to 96	1.11	
1863	15,293	148	1 to 103	0.97	
1864	15,591	157	1 to 100	1.00	
1865	15,425	197	1 to 90	1.16	
Total,	70,061	800	5 to 445	6.71	?

The total average for these five years is one case of twins to 89 single births; the average percentage is 1.12.

* Ramsbotham, page 445, foot note.

† Ib.

‡ Ib.

‡ In 1866 there were 17,437 births, and 197 pairs of twins. Proportion, 1 case of twins to 88 births; percentage, 1.13.

In 1867, the number of births were 17,007, and 183 pairs of twins. Proportion, 1 case of twins to 93 births; percentage, 1.07.

In twin pregnancies, it occurs that the sexes are more frequently the same in each case, than otherwise. Dr. Joseph Clark states that in 184 cases, both children were boys 47 times; and both girls 68 times; one boy and one girl 71 times.

Dr. Collins 240 cases, in which there were two males 73 times; two females 67 times, and male and female 97 times.

Dr. Lever gives 33 cases, in which 11 were boys, 11 girls, and 11 one boy and one girl.* Of 318 in the Royal Maternité Charity from January 1, 1828, to December 30th, 1840, 114 were of different sexes, 93 were both boys, 111 were both girls.†

A popular impression obtains, to some extent, that females, co-twins with males, are sterile or barren. This impression might have been derived partly from the well-authenticated fact, familiar to agriculturists, that amongst cattle the occurrence is almost universal. That is, cows that were co-twin calves with males are almost always unproductive; the exceptions to the rule being extremely rare. Such cows, upon examination and dissection, have been found to be defective in the development of their reproductive organs, and are called *free-martins*. Mr. John Hunter gave the subject a most thorough investigation, the result of which he embodied in an essay, which he read before the Royal Society of London, in 1779, and afterwards published it in the *Philosophical Transactions* of that year, and also in his work on the Animal Economy, in which he says: "The defective conformation of the free-martin cattle is attested not only by the observation of their sterility during life, but also by the anatomical examination of their reproductive organs." The impression that such is the case with the human female co-twins with males, we say, may have been derived partly from this source, and partly from the teachings and opinions of physicians of the last century. Dr. Burns, who, in his day, stood at the head of the British accoucheurs, and whose sayings were received as oracles of truth and wisdom, observes: "It is a popular opinion, and I do not know any instance to discountenance it, that if twins be of different sexes, the females are sterile." "I have never," he adds, "had an opportunity of examining the state of the uterus and its appendages after death."‡ This much from him was sufficient to bias the medical men of that

* Cazeaux, foot note, page 139.

† Ib.

‡ Simpson's *Obstetrical Memoirs*.

day in favor of the notion; hence it became a popular belief, and like many other medical heresies, has been preserved to the present time, though less generally entertained than formerly.

Dr. Simpson has taken great "pains to collect a series of data for the purpose of testing the validity of the opinion alluded to by Dr. Burns in the preceding paragraph." He succeeded in collecting one hundred and thirteen female co-twins with males, of whom one hundred and three had families, ten had none, or about one in ten without issue. He extended his researches to triplets and quadruplets, and found all the females, that had co-existed with males, in utero, productive. And the female, the only one of the quadruplets, became the mother of triplets. Dr. Simpson found, upon extending his inquiries still farther, that the relative proportion of unproductiveness, amongst these one hundred and thirteen twin women, did not exceed that of married women in general society. We have known several instances of females, co-twins with males, becoming mothers.

FIG. 65.



THE POSITION OF TWINS IN UTERO.

eral walls, as represented in Fig 65.

1. The Shape of the Uterus, and the Position of the Fœtuses in Twin Pregnancies. There is a marked difference between the shape of the uterus in twin and single pregnancies, at term. It is generally broader transversely, with not much, if any, difference in the antero-posterior diameter. This gives it a broader and flatter shape than is observed in uniparous pregnancies. This divergence is due to the position the fœtuses occupy in utero, which is with their dorsal surfaces to its lateral walls, as represented in Fig 65. Occasionally they are

placed one in front of the other. In this case* there is an undue narrowness in the transverse diameter, when compared with the antero-posterior, which is very much augmented, giving the abdominal protuberance an extraordinary anterior prominence. In order to economize space, the foetuses are usually observed to occupy a reversed position as regards their extremities; the head of one being in the fundus, and that of the other at the os, with the forehead and face of one next to the genitals of the other. This position causes the lower portion of the uterus to be more extended, giving it the appearance of an enlarged neck, and causing a divergence from the usual oval shape of the gravid organ.

2. *The Membranes and Placentæ in Twin Pregnancies.* There is a great want of uniformity in the disposition of the membranes in twin pregnancies. Cazeaux admits, with M. Guillemot, "that there are four distinct varieties, thus: in the first, two ovules are fecundated, and each embryo becomes developed and is surrounded by its own proper membranes; in the second, the ovule contains two germs, though each foetus has but a single envelope, the chorion being a common membrane; in the third, both embryos are enclosed in a single cavity, which appears never to have been divided by any membranous diaphragm; and finally, the last variety is met with, when the ovule contains the second germ, and both become developed together, which gives rise to what is called monstrosities by inclusion." This classification embraces every disposition that can be made of the membranes. The first of these varieties I was enabled to demonstrate to the class during the last session, (Session of 1866-67) from a most perfect, recent specimen, the result of an abortion at six months. There were two perfect ova, entirely distinct, as much so as though they had been the products of two women. They were boys, and both remarkably large and well-developed children for that period; each was enveloped in his own chorion and amnion, and attached to his own placenta. There cannot be much doubt but that these ova were the product of both ovaries, and that they reached the cavity of the uterus through both Fallopian tubes, formed their attachments on

* Originally drawn by Smelly, and copied here from Simpson.

each side of the organ, and were there developed separately. This undoubtedly is the case in all instances of distinct and separate twin ova. In the second and third varieties, where there is a union of the two ova into one, as, for instance, where each foetus has its own amnion and both are enveloped in one chorion, or where the two fœtuses are enclosed in one amnion and one chorion, with apparently one placenta, it is evident that the two ova are the product of one ovary, and they reach the cavity of the uterus through the same tube, from their attachments close together, and in the course of development lose their individuality in the complexity of the two.

Sometimes where the membranes are thus disposed, there are two tolerably well defined placentæ; at other times, there appears to be but one, having the two cords inserted into it: there is seldom any vascular union between them. I have seen such specimens, where no traces of a division line could be discerned between them, but which, upon being macerated a day or two in water, by means of which the medium of adhesion became dissolved, a complete division resulted, separating the apparently single placenta into two distinct and well-defined specimens, each one giving insertion to an umbilical cord. Rigby says: "in one rare instance of triplet placentæ the umbilical arteries of two placentæ anastomosed with each other, before dividing into smaller branches."

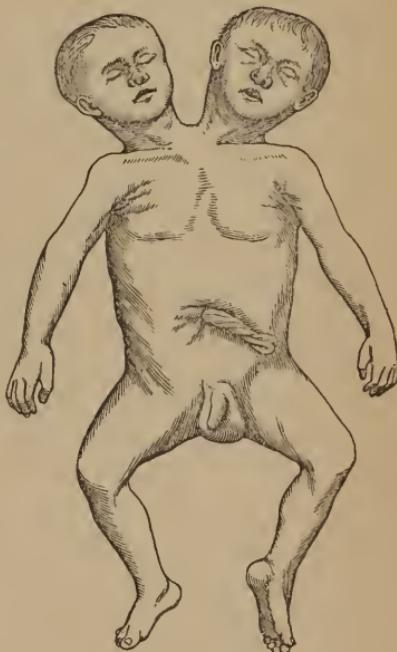
3. *Monstrosities.* In the fourth variety,—what M. Guillemot calls monstrosities by inclusion,—we have a still closer relation existing between the *ova*, or in other words, an excess of the germinial element in the *ovum*. It is well known by poultry growers, that there is found, occasionally amongst the eggs of the fowls, those that are double yolked, or containing a double vitellus; these eggs are usually distinguished by their superior size, and are excluded from the brood, on account of their producing monstrosities, which seldom survive their hatching more than a few hours at most, though it has been averred that they have in a few instances been reared to some age. They consist of one body, four legs, four wings, or both, or of two heads.

Now it is fair to infer analogically that similarly constituted ova may also be produced by the human ovary, that is, ova with a double yolk or vitellus. If this be admitted, and surely analogy

favors such an admission, the difficulty in comprehending the production of monstrosities in a measure vanishes.

All malformed children, congenitally so, where the malformation amounts to an excess or diminution of the natural parts of the body, are denominated monsters, such beings during foetal life, are always enveloped in one set of membranes, hence they constitute a single ovum. These monsters are of various shapes, and conformations. One was born in this city in 1847, of a German woman, which consisted of *two heads*, two arms, one body and two legs; a wax cast of it is in our University Museum, from which Fig. 66, was taken. Dr. Ramsbotham gives a cut of a similar instance with four arms in his work. Also another, in which the foetuses were more perfect, and at full time, they were united from the sternum to the navel, with but one umbilicus, A few years ago a monster was born at Boyle, County Roscommon, Ireland, which consisted of two children joined together at the hips, with a pair of well formed legs, protruding from each side, with a head and pair of arms at each end of the figure. The front view of the object presented the appearance of one continuous trunk. The genitals were between the legs that protruded from the right sides, a short distance from which, towards the centre of the abdomen was the umbilicus. A full description and cut is given of this in the *Cyclopaedia of Anatomy and Physiology*. This monster lived one week. Sir E. Home reports one similar to that represented by Ramsbotham.

FIG. 66.



Dr. Simpson relates a case of double monstrosity, that occurred in the practice of Dr. Lyell, of Dundee, in November, 1846.

These were two perfect children, united together from the top of the chest to below the navel, with a common umbilicus, and a single cord. This double product was dissected. The chest presented one large cavity, containing one pericardium, in which were two perfect hearts. There were four lungs. There was a single diaphragm, one large liver common to both bodies. The umbilical cord consisted of two veins and four arteries, thus presenting the constituents of two cords merged into one; its length was about eight inches; within two inches of the placental extremity it divided into two stems, which were inserted at separate points, into a single placenta. One of these children was born alive, and survived its birth eighteen hours. The children were eighteen inches long, and well-formed. The mother made a good recovery.

"This case," says Dr. Simpson, "is interesting *physiologically*, from one of the children having survived eighteen hours after birth. Isadore St. Hilaire cites five or six cases of *sternopage* monstrosity, as the whole yet reported by different authors; and Otto has more lately described nine additional instances; but in only one known example did any of the children survive its birth. The exceptional case is described by Beaussier, who states that one of the foetuses was dead born, but the other lived sufficiently long for the malformed being to be carried to the church for baptism. The possibility of the survival of either of the two children after birth, has, in almost all cases, been prevented by the hearts of the two foetuses being more or less conjoined and fused together, and by their intercommunicating by one or more cavities. In one instance recorded by Uccelli, the hearts were separate but of equal size. In Dr. Lyell's monstrosity, though they lay in a common pericardium, they presented this peculiarity, that they were quite distinct from each other, of the same size, perfect in their individual anatomical formations, and consequently perfect also and independent, so far as regards their physiological action."

There are instances of monsters living several years, as in case of the "Hungarian Sisters," who traveled for exhibition through Europe during a part of last century. They had double viscera, but a common anus. Each had a vagina, both terminating in a single vulva. One was more delicate than the other; there appeared to be an independence of physiological functions, to a certain

extent, as one would suffer with convulsions, while the other remained unaffected. One slept, while the other remained awake. When one craved victuals, the other did not. But they died at the instant, aged twenty-two years.

The celebrated Siamese twins, Chang and Eng, whose case is familiar to almost every body in the United States, made so by their extensive perorations throughout the country, and public exhibitions of themselves, afford an instance of longevity not usually awarded to beings of their class. In their case there appears to be much greater unity of function, than in that of the "Hungarian Sisters," though the extent of the union is much less than in the former case. The two bodies are united by a continuation of structure extending from the sternum of one to that of the other; this connecting structure is about four inches in length and ten inches in circumference. Their systems seem to act in unison. One cannot sleep without the other does. They awake from sleep at the same moment; both hunger alike, and desire the same food; in short, all the functions of the duplex organism are performed simultaneously, as if they were the functions of a single being. When young they took great pleasure in athletic exercises, were very fond of gunning, and enjoyed greatly the excitement and sports of the chase. They consulted all the best surgeons of America and Europe in regard to the possibility of a safe separation. The united opinion was, that such an attempt would be extremely hazardous, and probably cause the instant death of both. So they have remained as they were born, united. They married sisters, both have children, and now, at the age of near fifty, reside on their plantation, in the State of North Carolina.

Many other cases of curious malformations might be cited, such as a kind of parasites, or small, undeveloped foetuses attached to some part of the body of a larger and more perfect one, etc., but the length of this digression admonishes us to desist from a further pursuit of the subject at present. The subject of monstrosities will be referred to again.

In many instances of twins, women go their full time, and the children are well formed and fully developed; but there are many others in which labor, excited by an over-distention of the uterus, comes on prematurely, in which case the children are small and

undeveloped, and often one or both are still-born; and if born alive, they frequently survive their birth only a few days at most. It is no uncommon occurrence for one foetus to die in *utero*, and the other remain alive and sustain a companionship with its dead brother for several weeks or months. And it has occurred when the living child has been born at term, and the dead one be retained in the uterus for some time afterwards. Perhaps the most remarkable case of the kind upon record, is that given by Guillemot, in which the dead foetus was retained for two years after the accouchment, and then extracted by artificial means. Various opinions have been advanced, explanatory of the cause of these intra-uterine deaths :

"M. Guillemot believes that one child, in its growth, squeezes and presses the second gradually against the uterine wall, and the latter, not having sufficient space for its development, soon after dies."

"Mauriceau and Peu thought this might be attributed to the fact, that one child, by receiving all the nourishment, becomes strong and vigorous, and defrauds the other, thereby rendering it feeble and languishing, and causing its early death."

"M. Curveilhier explains the atrophy of the foetus by the successive separating of the placenta, founding his opinion on a single case in which the hemorrhage was abundant enough to account for the early death of the twins; but in the greater number of cases that have been recorded, no mention whatever is made of any hemorrhage during the pregnancy; whence, of course, the opinion of M. Curveilhier would not be applicable to them."

Lastly, "Cazeaux believes these cases, in which the death and atrophy of one foetus takes place, should rather be attributed to some disease of the infant or placenta, or some other part of its envelops."*

It is not presumable that they are to be attributed to any one cause in particular, but that they may be referred to any of the multitudinous causes that may be productive of such a result. Perhaps they may be chargeable to accident as often as any thing else. I am indebted to the kindness of my sister, Anna M. L.

* Cazeaux's Midwifery.

Potts, M. D., of Adrian, Michigan, for the following case in point:

"Mrs. Cline was pregnant, and advanced seven months when she was threatened with labor, soon after a lively romp with her brother. Periodic pains occurred. I was called; and by rest and proper anodyne treatment, she went her full term of gestation. Was then delivered, June 1st, 1862, of one living child, active and strong; weighed seven and a half pounds, and of a small, partly decomposed foetus. Both had been sustained by one placenta. It was my opinion that the one lost its life about the time of the abortive effort, from the size of the bones and state of development. It did not decompose more rapidly, because of its being enclosed in a shut sack, excluding the atmospheric air. The mother and living child did well. This may not be of much interest, other than showing that a living and dead child may exist in utero together some length of time, without the former being materially injured by the latter."

There is but little doubt that the foetus, in this instance, lost its life in consequence of the imprudence of the mother. And it is highly probable that in most cases of twins, where one or both die in utero, death is produced in the same manner that it is in single pregnancies; therefore, it is unnecessary to be searching for extraordinary causes, while those of ordinary occurrence are sufficient to account for the circumstance.

Dr. A. Barnes, of this city, informs us that he was cognizant of the following case:

Mrs. M. F., on the 20th of August, 1845, aborted at three months of a male foetus, and four months afterwards, being at the seventh month of pregnancy, gave birth to another male, living child, which is still alive.

SECTION II.—TRIPLET PREGNANCIES

Is when three ova are fecundated and retained in the uterus at one time. These ova may be the product of one or both of the ovaries. One may give off two and the other one, or all three may escape from the same ovary. If both are involved in yielding the ova for fecundation, both Fallopian tubes are engaged in transmitting them to the cavity of the uterus;

but if one ovary supplies the whole, only one tube is employed in conveying them to the uterine cavity. As in the case of twins, all three of the ova may become fecundated by a single copulation, or more than one may contribute to the event.

The proportion of triplets to single pregnancies and births is very low, being in France but one to six thousand and ninety-five. The proportion of triplets to twins, in the same country, is one to ninety-seven. In England it is one triplet to four thousand four hundred and seventy-three single; and one to sixty-nine of twins.

In Germany it is one triplet to seven thousand one hundred and eighty-five single; and one triplet to eighty-five twins.

The total aggregate in these three countries, is one to five thousand eight hundred and thirty-one single; and one to seventy-five twins.*

The following table, prepared from the official reports of the Philadelphia Board of Health, for five years, shows the average of the proportion of triplets to single births, and also the proportion to twins, in that city, during the time mentioned:

Years.	Births.	Twins.	Triplets.	Proportion of Triplets to Single Births.	Proportion of Triplets to Twins.
1861	9,008	162	2	1 to 4,504	1 to 81
1862	14,741	154	1	1 to 14,741	1 to 154
1863	15,293	148
1864	15,591	157	4	1 to 3,898	1 to 39
1865	15,425	179	3	1 to 5,142	1 to 59
Total.	70,058	800	10	4 to 28,285	4 to 333†

Thus, it will be seen, the proportion of triplets to single births is one to seven thousand and six, and the proportion of triplets to twins is one to eighty-eight. In five hundred and nineteen thousand and fifty-nine births in England, France, Germany and Philadelphia, there were eighty-seven triplets, averaging one to five thousand nine hundred and eighty-nine. There were five thousand nine hundred and twenty-six twin births, making one triplet to sixty-eight twins. The proportion between this number of single

* Cazeaux from Churchill.

† In 1866, there were 17,437 births, 197 cases of twins, and 3 sets of triplets; proportion of triplets to single births 1 to 5,812, of triplets to twins, 1 to 65. In 1867 there were 17,007 births, 183 pairs of twins, and 4 sets of triplets; proportion of triplets to single births, 1 to 4,251; of triplets to twins, 1 to 46 nearly.

and twin births is one to eighty-eight. The ratio between single and twin births, and between twins and triplets, is as eighty-eight to sixty-eight.

In a large majority of triplet cases there are two ova; one contains two foetuses and the other but one. In the double ova of triplets we might expect to find a disposition of the membranes similar to that found in many cases of twins, viz.: each foetus enveloped in its own amnion, with a chorion common to both; but from all that can be gathered, it is evident that the two are, as a general thing, enveloped in an amnion and chorion common to both, with one, or apparently one, placenta. Where two foetuses are enclosed in one set of membranes, with an apparent single placenta, it is conceded that there were two distinct ova originally, that they were the product of one ovary, and that they reached the uterine cavity through the same Fallopian tube, whether in a case of twins or triplets, and that the individuality of the ova becomes lost by their being merged into one during primitive development, resulting from the close proximity of their primary attachments to the lining surface of the uterus. The second ovum, containing but one foetus, it is equally evident, was produced by the other ovary, and descended to the cavity of the uterus through the other tube, formed its attachment near the point of entrance, far distant from the others, and was there developed singly; hence its isolation from the others, and its independence of them.

Case I. I am under obligations to the kindness of my friend, Dr. J. A. McGuigan, of this city, for the following interesting case, in which are involved many very important points:

The Doctor say: "On the 26th of August, 1865, I was called to attend Mrs. Mary O'Connor, a native of Ireland, and the mother of six children, in her confinement; she had gone her full time, without any unusual symptoms, save that of being excessively large. The six previous births were all single and at full term. But multiples were common to the family, on both sides. an aunt and a grand-aunt of hers, having had twins; and her mother-in-law had had twins twice; the husband being a twin-brother himself.

"When I reached her bed-side, she had—according to her own

statement—been in labor nearly two days, but I have reason to believe that active labor did not set in earlier than five hours before the first child was born. This labor was neither longer nor more severe than usual. I attended her in a subsequent confinement, thirteen months after, and I cannot say but that the latter was equally as severe and protracted as the former.

"In making the vaginal examination I ruptured the membranes, and almost simultaneously with the gush of waters, was effected the expulsion of the first child. Its presentation was cephalic, and position vertex to the left acetabulum. Finding the uterus but slightly contracted I carried my hand up and found a second foetus, with the same presentation, but the vertex to the left sacro-iliac junction; in half an hour this one was born.

"Placing my hand upon the abdomen, I discovered that the uterus had not perfectly contracted, and upon again introducing my hand, I discovered a second sack entire, a foetus which presented its knees looking towards the anterior walls of the mother's abdomen, and that the placenta of the first two was partially detached and bleeding freely. I ruptured the membranes, I rotated the body and delivered. The time occupied in delivery from the expulsion of the first to the birth of the last, was forty-five minutes. Finding as yet but little reduction of the uterus I again passed my hand up and detached the first and bleeding placenta, leaving the second and undetached one to the efforts of the uterus—still there was no response. The uterus seemed overstrained and totally inert, and the woman fainting from the loss of blood; titillation was ineffectual; ice could not be had; nothing I called for was at hand; seeing some common salt on the table I introduced about a dessert-spoonful with the hope of provoking contraction, and to my delight the answer quickly came, and with it the remaining placenta.

"The three little girls next claimed attention; seeing such fine, plump, well developed children, I obtained permission to weigh them, and found the last born the heaviest, weighing six pounds and ten ounces. The second weighed six pounds and nine ounces; the third weighed, but first born, weighed six pounds and six ounces; total, nineteen pounds and a-half. They lived respectively three, five and eight weeks; their deaths may be attributed to ignorance

on the part of the nurse, and sheer neglect, as they were fed, despite my earnest entreaties, on potatoes and other coarse food; the mother not having a sufficient supply of milk for their sustenance.

"Upon examining the secundines, I could find only two placentæ and two sets of membranes, each coming away distinct from the other; one placenta having one cord inserted in it, while the other had two; and so closely were they implanted together at their insertion, that I could not distinctly trace whether the placenta was originally one, or formed by a coalescence of two. I am positive there was but one set of membranes to each ovum. With the exception of some trifling rigors, the next morning after the accouchment, the patient had a fair recovery, notwithstanding she was incessantly annoyed by visitors; she was up and about her room on the tenth day."

This case affords one of the most perfect specimens of triplets on record. Viewed in all its aspects, it presents a series of phenomena seldom met with in the history of triplet births. 1. No unpleasant symptoms during gestation, except the mere inconvenience "of being excessively large." 2. The quickness, and safety of the accouchment. 3. The single ovum containing two foetuses, with but one set of membranes and apparently one placenta—and the unusually favorable circumstance of two foetuses in one ovum, both with head presentations—thus diverging from the usual course of reverse positions. 4. The distinctness and perfection of the ovum containing the single foetus, and the healthfulness and integrity of all the membranes. 5. The ease with which the "over-stretched and inert uterus" was made to respond to the means employed to effect contraction, and arrest the hemorrhage. 6. The very unusual size and development of the children. 7. The inclusion of the two foetuses in one amnion, illustrating the position stated heretofore, that in triplet pregnancies such inclusion is more frequent than in those of twins. 8. And lastly: her extraordinarily good getting up, considering her labor had been one of triplets, and the daily annoyance she was compelled to endure, from the crowds of curious visitors, who kept her under constant excitement.

Case II. I am indebted to the urbanity of Dr. David E. Gardiner of Bordentown, N. J., for the following case. Writing under date of April 16th, 1867, he says: "I was summoned, on the 9th

of March, 1867, to attend Mrs. Catharine Thorn, age 37 years, in her fourth confinement; she was at about her seventh month of gestation, she was very large; at six months and a-half she was as large as at nine months in her former pregnancies, and was very burdensome to herself. During the first three months she suffered severely, with a sense of fullness of the head and vertigo, after that time she remained very well. Her third child was born with club-foot. She had never had twins, but compound pregnancies were common in her family, and that of the father. They had twins on both sides; an aunt of Mrs. T. had twins, and one of these had twins.

"She was over forty-eight hours in labor, which, though protracted, was no more severe than common. About an hour elapsed between the births of the children. The children were all females; each child weighed about three pounds, the aggregate weight was nine pounds. They measured fourteen inches long, and four and a-half inches across the shoulders. One lived six hours, the other two about two hours. There were three placentæ, three cords, and three sets of membranes, *i. e.*, one of each to each child. And in each case, the child, placenta and membranes were expelled simultaneously.

"They were rather spare, but all well developed for the time. The mother had a very good getting up."

In this instance we have the rare circumstance of three separate and distinct ova. In this case it is highly probable one ovum came from one ovary, and the other two from the other ovary, and upon entering the uterus the last two became so far separated, as to form their attachments at too great a distance from each other, to form a coalescence during their early embryonic development—hence the three ova, or the same circumstance might have occurred, even if one ovary had furnished all three of the ova.

This case affords another instance of at least an apparent hereditary tendency to compound pregnancies. And also another instance of sameness of the sex of the children.

Sometimes many hours elapse between the births in cases of compound deliveries, an illustration of which is afforded by the following comic item that is now going the rounds of the papers:—At Rockhill, South Carolina, recently, a woman became the mother

of five pounds of daughter; forty-two hours after, five and three-quarter pounds more of daughter resulted, "simultaneously succeeded" by eight pounds and four ounces of son, all to the delight of a father more than seventy years old. "All doing well." Few have done better.

Case III. The following items I obtained from the lady herself. She had no accoucheur at the time of her accouchement, nor a professed midwife, even, but was assisted by a neighbor woman only:

Mrs. Whelen, native of Ireland, was taken in labor for the fifth time, in April, 1852. She had previously suffered no particular inconvenience, except an undue degree of helplessness, and œdema of the lower extremities. She was at her full term. The first child was born at twelve o'clock, M., with but very little pain, after which she felt as well as ever she did in her life (to use her own expression); felt strong, and partook of a hearty dinner; felt well most of the afternoon; towards evening began to have some pain, and at six o'clock the second child was born, and when told that there was remaining in the uterus yet another, she got frightened, became nervous and weak; in about half an hour the third one was born. The children were all girls, and alive, they were rather small, but plump, well-developed, and healthy. One of them died in ten days. The other two grew to be remarkably fine children, and died of small-pox, at six months of age.

Unlike the former case, no portion of the families, on either side had ever had multiple births. The lady herself had had twins once. Her first labor was single, second twins, one of which is yet living, the third and fourth, single, the fifth, triplets, she has had several children since, but all single births.

Her labor with the triplets, she represents as being no more severe than the single ones; she had no more pain, and lost no more blood than usual.

She does not recollect of there being more than one placenta; she did not hear any more spoken of. But as she is not positive on this point, we are at a loss to determine whether there was but one ovum containing the three fœtuses, or a plurality of ova.

She was three months in recovering from her accouchement; general debility was the principal hindrance to her more speedy recovery.

The importance of this case is derived from the fact of its showing what can be accomplished by the unassisted powers of nature, in a healthy organism; that interference is not always necessary; but it does not follow from this, that skilful and careful medical aid can be dispensed with safely, but it teaches that reliance should be placed upon the natural efforts of the system, as being competent to accomplish much, and that assistance should be at hand, only to be employed, when nature is inadequate to the work. In the first case, the woman would probably have died from hemorrhage, had not skilful aid been at hand, to protect and save her.

Case IV. The following case was reported to me by my sister, A. M. L. Potts, M.D., for which my acknowledgments are due, and whose indulgence I crave for taking such liberty with her private correspondence. It, in common with all these extraordinary cases, has its points of interest. She says, in a letter bearing date February 18, 1867 :

"December 1st, 1865, I was called to attend Mrs. H., of Adrian, Michigan, in her confinement. Almost immediately after my arrival a child was born, and living. In about two hours the second one was born, and living; the third followed the expulsion of the second in due time. It was still-born. The two last were supplied by one placenta. The cord of the second was too short to allow of its escaping without partially detaching the placenta from the uterus, which interfered with the placento-fœtal circulation in the third child and caused its death. It was a breech presentation, but there was no difficulty in the delivery. The placenta followed immediately. I cannot account for the death of the last child in any other way. The second child had *spina bifida*, and did not live over three months. The children were all girls, and weighed five pounds and a few ounces each. The first-born is living. The mother's recovery was very good."

In this case there were two ova; the first-born occupied the membranes of the single one, while the two last occupied the other. In this instance, one of the latter presented by the head, and the other the breech, which is in uniformity with the positions usually observed in double ova. Here, also, we have an instance of too short a cord, and one of the results attending it, viz., a disturb-

ance of the utero-placental attachment, and a consequent interference with the foetal circulation, resulting in the death of the foetus; a circumstance not unfrequent in single pregnancies, where a like defect in the cord exists. In triplets, as in cases of twins, several hours sometimes intervene between the births, as illustrated by the following cases:

Case V. A woman in Redbridge, R. I., became the mother of two infants one day last week, and the following day another was added to the family. The mother and three babies are doing well.—*Philadelphia Ledger*, October 12, 1867.

Case VI. A lady of Chelsea, Massachusetts, has just given birth to triplets, one boy and two girls, fine healthy children, who, with the mother, are doing well. The boy and one girl weigh five and a half pounds each, and the other four and a half.

We clip the following case from the *Ledger* of April 10, 1868. It is remarkable for aggregate weight of the children:

Case VII. Mrs. Daniel Cochrane, of North Brookfield, Massachusetts, recently gave birth to three girls, aggregate weight twenty-three pounds, and all doing well.

The enumerated signs which purport to decide the woman to be the subject of multiple pregnancy, according to Deweese, are “1st, The extraordinary size of the abdomen of the woman. 2d, The division of the abdomen into tumors upon its anterior surface, occasioned by the unequal stretching of the recti-muscles. 3d, An oedematous condition of the inferior extremities after the third or fourth month; and 4th, The various or numerous places at which the woman feels motions or stirrings.”

Latterly, great reliance has been placed upon auscultation, as a means of diagnosing multiple pregnancies; but as there is a great deal of uncertainty connected with this, it cannot be estimated as of any special value, further than an adjunct to other means of diagnosis.

The accoucheur is frequently solicited to make a decision in regard to the probability of a plural pregnancy, when the woman thinks she has cause to suspect it. He should always be extremely cautious in deciding this question, as the signs are so unreliable, that it cannot be done with any degree of certainty, one way or the other. In this case, the noncommittal policy is certainly the safer one; and if it could be ascertained, the enunciation of the

fact might be attended with no good results, particularly to a nervous, sensitive woman.

SECTION III.—QUADRIGEMINI, OR QUADRUPLETS PREGNANCIES

Consist of four feeundated ova being lodged, retained and nourished in the uterus from conception to parturition. These are of such very rare occurrence that it is impossible, in the present state of statistics, to arrive at any thing like a correct estimate of the proportions between them and single births, or between them and twins or triplets. In 129,172 women delivered in the Dublin Lying-in Hospital, reported by Dr. Collins, there was one case of quadruplets.*

“M. Bourdois (*Gaz. Med.*, p. 596, 1840) describes a quadruple pregnancy, in which the delivery occurred at the seventh month. The second child was born twelve hours after the first, and the other two a few minutes subsequently. The second accouchment was attended by a new discharge of waters. There were two placentas, one of which had three cords and was adherent, and some portion of it remained behind in the uterus.”†

This placenta, with its three cords inserted, indicates that three foetuses occupied one set of membranes; or, in other words, that the three entered into the constitution of one ovum. The birth of these three is what Bourdois calls the second accouchment, and occurred twelve hours after the delivery of the first, and was attended by a new discharge of waters. This was evidently occasioned by rupturing of the membranes of the second ovum, which contained the three foetuses, that were born within a few minutes of each other. The first, born twelve hours before this second accouchment, was evidently from the single ovum, enveloped in its own membranes, and supplied by its own placenta. This was undoubtedly the product of one ovary, and the other three that of the other; the single one entered the uterus through one Fallopian tube, and the other three through the other one.

“Gottlob mentions the ease of a woman who, in three births, produced eleven children,” being quadruplets twice and triplets once.

Case I. The following case of quadruplets that occurred in

* Ramsbotham, p. 445.

† Cazeaux, p. 139.

Egg Harbor City, N. J., was kindly furnished me by my friend, Dr. J. Keller, for which I acknowledge my indebtedness. The doctor writes as follows:

Mrs. Sophia Witt, a native of Hamburg, Germany, was delivered of quadruplets in this city on the 8th of October, 1866. I was not present at the accouchment, which I very much regret; I was not called until it was over. I collect the following items in relation to the case from the midwife, a very intelligent German lady, who was in attendance. Mrs. Witt went her full term. She was not very large, not sufficiently so to cause suspicion of twins even. She was in very good health, and comfortable during gestation. She was thirty-four years of age. She was mother of three children, aged respectively six, four and two years. They were all single children, all living and healthy; compound pregnancies were not common in her family. She was in labor about three hours previous to the appearance of the first child; first, head presentation. After the birth of the first, there was a suspension of labor-pains for full three hours. The second was delivered by turning, and the third and fourth by manual assistance. The labor was not more severe than usual. The children were all boys. Their weight was from two and a half to three pounds—total, eleven pounds. There were two placenta. Three funiculi umbilicalæ were inserted in one placenta, with one set of membranes; one child having his own placenta funicula umbilicalis and membranes. The first child died immediately after birth, about noon, the second the same evening, the third after two days, and the fourth lived two months and ten days. They were very thin, spare and immatured, though the hair, nails and skin were fully developed. There was a senile appearance of their faces. The mother had a usually good getting up.

In this case we have another instance of three foetuses in one ovum and one in another. Three matured ova escaping from one ovary and reaching the uterine cavity through one Fallopian tube, and one from the other ovary, and transmitted by the other tube. It is a remarkable fact, that in the four cases of triplets, and the two cases of quadruplets here mentioned, the sexes of each birth were uniformly alike. The four cases of triplets producing twelve girls, and the two of quadruplets eight boys.

The following item, just going the rounds of the public journals, taken from the Philadelphia *Ledger*, if reliable, furnishes another instance of quadruplets where the children were all boys: "A lady in Aiken, S. C., has presented her husband with four fine male children."

Case II. We clip the following from the same paper, of Wednesday, May 9th, 1867: "In Brooklyn, on Monday, a woman gave birth to four children, whose aggregate weight was twenty-four pounds. All are doing well." As confirmatory of this we take the following from the same paper, of June 7th, 1867: "The citizens of Brooklyn, N. Y., are getting up a testimonial for Mrs. Quin, who recently gave birth to four children. As usual, in such cases, Mrs. Quin is a poor woman."

Case III. From the same paper, of Monday, November 11th, 1867, we take the following: "The wife of Mr. Frederick Essler, a shoemaker, residing in Park Avenue, near Cumberland Street, Brooklyn, gave birth to four infants, on Tuesday morning last. They weighed on an average eight pounds each. Two are males and two are females. Mother and children are doing well."—*N. Y. Sun.*

Case IV. From the same journal, January 28th, 1868: "The wife of a lager beer dealer, in Louisville, Ky., gave birth, a few days since, to four bouncing boys."

Case V. The wife of Mr. James Waters, of Boon county, Missouri, was lately delivered of four healthy boys at one birth.

"Professor Dugé's states, that agreeably to the register of 'La Masion d'Accouchemens de Paris' for twenty years, in thirty-seven thousand four hundred and forty-one deliveries, no instance of a higher number than triplets occurred at a birth; nor in L'Hospice de la Maternité nor Hôtel Dieu, for sixty years previous to the year 1821, in one hundred and eight thousand cases, not one instance of quadruplets was observed." But he adds that "instances of quadrigemini have occasionally been met with. Lately the journals have announced a case of this kind; and a similar case occurred in Paris in October, 1823."*

Dr. Gooch says: "The uterus very seldom contains more than

* Dewees' System of Midwifery.

two children, though in very rare instances it may contain three, four, or even five. Mr. Rigby, at the age of eighty, was the father of four children at one birth." It was nothing to *his* credit; it only shows that four matured ova had escaped from the ovaries, and were traversing the Fallopian tubes at one time, and that they all became fecundated at probably one coitus.

SECTION IV.—QUINTUPLETT PREGNANCIES.

Quintuplet pregnancies consist of five fecundated ova being received in the uterus, and retained and nourished there from conception to parturition.

These cases are of extremely rare occurrence; though in the history of our art they have appeared sufficiently often to entitle them to consideration in the study of general obstetrics. We have not been able to meet with a single case of quintuplet births, in which the process has been fully detailed; all we can do, therefore, is to compile and present to the student such reports of cases as have been preserved by different authors as authentic, in a condensed form, and thereby relieve him of the labor of searching for the fugitive cases that are scattered throughout the records of obstetrical literature.

Dr. Francis H. Ramsbotham says: "In the Museum of the College of Surgeons, in this city, there are five foetuses preserved, which were expelled at one birth, under the care of the late Dr. Hall, of Manchester. They had advanced to five months intra-uterine age." In a foot note on the same page (446) he says further: "There are several other well attested cases of five children at a birth. One will be found in the *Gentleman's Magazine* for 1736, the patient lived in the Straus; another, in the same periodical, at Wells, Somersetshire; one occurred in Upper Saxony; one near Prague, in Bohemia," (*Garthshore Philosophi. Trans.*, 1787.) Chambon relates a case of five which lived long enough to be baptized, (*Campbell's Midw.*, p. 291.) And Osiander says, according to a letter, that a woman was delivered of five living children, near Oporto, in 1788. (*Meigs' Velpeau's Midwifery*, p. 530.) In the *British and Foreign Medical Review*, for 1839, a notice is given of a woman at Naples being delivered of five children at seven months. In the *Dublin Medical Journal*, for 1840, there is an account given of Dr.

Evory Kennedy having shown to the Dublin Pathological Society five ova of between two and three months, which were expelled at once, under the superintendence of Dr. Thwaites. They were all male children. And if we could credit newspaper reports, we might add the following: The wife of a cannon-founder, at Luginski in Russia, was delivered on May 22d, 1836, of five girls, of whom four were living and likely to do well. (*Satirist*, August 7th, 1836). The *Giornale del due Sicilie* states, that a woman was safely delivered, on June 21st, 1838, of a boy and four girls, all of whom died at the expiration of half an hour. (*Times*, July 23d, 1838.) The wife of a landed proprietor at Altruitweida, near Mitweida, in Saxony, was recently delivered of five daughters, who, though perfect in their conformations, died in about half an hour after their birth. (*Times*, August 29th, 1838.) The wife of Aaron Rowe, living three miles from Mount Vernon, Ohio, on the 3d instant, gave birth to three boys and two girls, all of whom with their mother are doing well. (*Philadelphia Ledger*, December 27th, 1867.)

Dr. Dewees says: "We, however, find, in the *Albany Argus*, the following account of 'unparalleled fecundity': Dr. O. F. Paddock, a respectable physician of Fort Covington, Franklin county, gives in the *Franklin Telegraph*, an account of an extraordinary birth of *five children* at one time, from the same mother; three daughters and two sons. Four of them were born alive, but lived a short time. The birth was premature by three months, but they were perfectly well-formed and well-shaped. The average weight was about two pounds, and not much difference in their size. Their parents lately emigrated from Ireland, and arrived in this country in August last. This is rendered more remarkable by the fact that the mother of these five was delivered on the 20th of last February of two, making in the whole, seven children in less than nine months. The last were born on the 25th of November, 1826."*

This case is styled "unparalleled" but Dr. Dugés states: "that there is a case mentioned (*Biblioth. Med.* tom. 19, p. 374,) on the authority of Petretein, a Greek physician, in which were delivered

* The time between the births of the two and the five children was nine months and five days.

prematurely (seven months) three females living, one dead, and one boy, all equally well developed" (*System of Midwifery*).

Thus since 1736 we have presented thirteen cases of quintuplets, nine upon medical authority, and four upon newspaper testimony; which make thirteen in one hundred and thirty years, or one in every ten years.

It is stated that Dr. Osborn met with a case of six distinct ova, thrown off at one abortion. Ramsbotham questions the authenticity of the statement.

As newspaper items have been quoted by some authors, as kind of semi-authentic, to be taken for what they are worth, we present the following, from the Philadelphia *Ledger*, of March 2, 1868, which, if true, stands unrivalled in either the traditional or written history of the human race: "The wife of a retired soldier, living at Nunn's Hill, near Valparaiso" (what Valparaiso?) "has recently brought forth at one birth, four boys and two girls, and is suckling her children herself."

CHAPTER II.

COMPLICATED PREGNANCY.

ACCORDING to the definition heretofore given of complicated pregnancy: it consists of one or more foetuses, and some extraordinary growth or growths, as one or more moles, hydatids or uterine tumors, existing together within the uterus. Cazeaux defines it: "Where the positive existence of a foetus is coincident with that of a pathological tumor of the abdomen." If this were so, any pathological condition of the abdomen apart from the uterus, that should complicate pregnancy, co-existing with a foetus inside, might be termed with equal propriety, complicated pregnancy. Such a definition gives no definite idea of the precise state of the uterine contents, in contradistinction to extra-uterine pathological conditions. If such extra-uterine conditions that might compli-

cate pregnancy, as ovarian tumors, &c., constituted complicated pregnancies, the idea might be extended so as to include all pathological irregularities, that might interfere with pregnancy and complicate it, such as convulsions, hemorrhage, phthisis, dropsy, &c., and which also, when co-existing with pregnancy, be defined as complicated pregnancy. Real complicated pregnancy, on the contrary, relates to the complications with the uterus and its contents, irrespective of extra-uterine conditions; and in this limited sense alone should it be considered. I am fully aware that this is a divergence from the ordinary course pursued in considering the varieties of pregnancies, but it is preferable, on account of its being more precise and scientific. We are compelled to adopt this course, or admit into the inquiry the whole group of pathological conditions that might interfere with, or complicate pregnancy. If we admit, into the question one extra-uterine tumor or other abnormal product, we open the door for the admission of all others, which is not deemed advisable at present, as all those matters will receive a due share of attention in other connections.

SECTION 1.—FIBROUS TUMORS CO-EXISTING WITH THE FŒTUS IN UTERO.

These may be pediculated or non-pediculated, and they may occupy the substance or a portion of the cavity at the neck, body, or fundus, and very materially interfere with the growth and expulsion of the foetus. "These tumors may be developed in the neck just the same as in the tissue of the uterine walls. Madame Boivin and Dr. Dugés found, when making a *post-mortem* examination of a woman who died of peritonitis, after a painful though natural labor, a fibrous body, about the size of the fist in the substance of the neck; the child had a fractured cranium and was still-born. In another case of the kind Ramsbotham was obliged to resort to embryotomy; but the woman recovered" (Cazeaux).

Four cases of the fibrous tumors of the uterus, which complicated pregnancies, are given by Dr. Simpson. Two of the women recovered after parturition, and two died.

2. *Polypi* arise either from the cavity of the body, fundus or

neck, and occupy more or less space, and complicate pregnancy to a greater or less extent; but are less serious than the non-pediculated, broad-based, fibrous tumors; their pedicles, sometimes long and slender, allow of their displacement from the cavity, and render their excision feasible, in case their presence interferes materially with parturition.

Moles and Hydatids are occasionally developed with the foetus in utero, but interfere less with gestation and parturition than either of the former complications. A few years ago I attended a woman who was delivered at full term of a small child and two fleshy moles, one of which was about the size of a man's fist and the other the size of a hen's egg. About an hour after delivery of the placenta, during my temporary absence, the woman in whose care she was left, disregarding my injunctions to keep her quiet, undertook to change her and put her to bed, during which operation she was attacked with a violent hemorrhage, of which she died in a few minutes. I arrived just in time to see her breathe her last.

I know of no means of connecting the hemorrhage with the fact of the presence of the moles, unless they impaired the tonic powers of the uterus, and thereby favored an undue relaxation of the organ.

The presence of these growths cannot be detected during gestation, and is only revealed by parturition.

The unpediculated fibrous tumors, may be suspected by the irregular shape of the abdominal protuberance, and the difference in its density or hardness, in different parts, one or more parts of it being very hard and unyielding, while other parts are more soft and yielding. The presence of them is often determined before pregnancy, by the undue enlargement of the uterus and its modulated and irregular feel. The polypi may be detected by the frequent hemorrhages, and by the appearance of the tumor protruding through the os uteri, before or during gestation, or at the time of labor. These evidences of morbid growths, or lesions of nutrition, co-existing with the ordinary signs of pregnancy, indicate the complicated character of the ease, and aid the accoucheur materially in making a correct diagnosis.

CHAPTER III.

SPURIOUS OR FALSE PREGNANCIES.

SPURIOUS or False Pregnancy, is where the uterus contains a mole or moles or hydatids. The latter is also denominated a mole, and to distinguish it from the former is called vesicular mole. The former consists of a solid fleshy mass, of uncertain size. The term mole was formerly applied to every mass that issued from the uterus, whether coagulated blood, detached tumors, or blighted conception. The French have rejected this definition, and confine it entirely to the last of these substances. For the sake of convenience in describing them, these are generally denominated moles, and the latter variety are known as hydatids, and consist of a number of vesicles, of an oblong or round shape, ranging in size from that of a small pea to a common-sized marble—they are suspended from a common centre stock, by small pedicles, and have been compared to a bunch of grapes. They usually occur at first in small numbers, outside the ovum, *i. e.*, between the chorion and decidua. As they multiply in numbers and increase in size, they encroach upon the ovum, until its figure is obliterated. They may grow from the placenta, or any part of the ovum. When they are small and attached to the ovum, they float in fluid in the uterus, and all are enclosed in the decidua. They consist of three coats, the external serous, thin and transparent, the middle fibrous, and the internal mucous. They contain a fluid, the small ones white, the large yellow. They remain in the uterus longer than the other varieties of moles; one case is related, where fifteen pounds were expelled, which were five or six years in accumulating. The pathology of these growths is of importance in a medico-legal point of view. It is the united opinion of all modern pathologists, that they are the result of conception. Clots, polypi, tumors, etc., are not, but both varieties of moles are always the result of impregnation; hence common consent has awarded to them the title of "false conceptions." This fact, however, should not be allowed to jeopard the reputation of a widowed woman, who may discharge one of these bodies, too long after the death of her husband, to bring her

within the allotted time of legitimate gestation, as they may be retained in the uterus for years after the commencement of their formation. Dr. Joseph Pancoast, the distinguished Professor of Anatomy in the Jefferson Medical College, reports a case of a flesh mole of thirteen years' standing, and when expelled was the size of a man's fist and weighed three-quarters of a pound.

Various unsatisfactory theories have been advanced, in reference to their origin. That of the solid fleshy mole, has been attributed to the rupturing of blood vessels, the deposit of lymph, and the development of false membrane, or probably from inflammation. The organization partakes of the nature of the part to which it may be attached. As for instance, if to the placenta, it is more spongy; to the uterus, more dense; to the membranes, vesicular. The pathology of the vesicular mole or hydatids is very unsatisfactory. The blighted or false conception, results from an accident in gestation, sufficient to destroy the life of the embryo, which becomes dissolved in the liquor amnii; remains of the cord, placenta, small bits of bones, hair, &c., have been found within the ovum, and the membranes entire, with blood, coagula and deposition of lymph between the membranes. This in two or three months degenerates into the fleshy mole, of a dense texture, and more shapeless than a healthy ovum, it is generally oblong, or egg-shaped, more or less flattened, bearing some resemblance to the shape of the uterine cavity, the coagula becomes more perfectly organized, they are not spongy, like the placenta. There is usually but one at a time, but there have been instances of more. They seldom continue in utero longer than four or five months. At an uncertain period the uterus takes on expulsive efforts, with all the phenomena of labor, perhaps with more previous mucous discharge and more hemorrhage; in due time the mole is expelled.

Fleshy moles are not distinguishable from early abortion without close examination. The expulsive efforts cannot be distinguished from those of labor or abortion, nor is it essential that they should be. The symptoms are precisely those of pregnancy, as suppressed menstruation, enlargement of the abdomen, dark areola, enlargement of the breasts, secretion of milk, morning sickness, etc., etc. Some of the signs of pregnancy of course are absent, as the foetal motion, sound of the foetal heart, etc. Sometimes there is some pain on pressure, and a serous or sanguineous discharge from the

vagina. When complicated with pregnancy, the presence of the mole cannot be detected.

Diagnosis. From true pregnancy, the duration of the tumor after utero-gestation. The disproportion between the size of the abdomen and the time. In case of mole, the enlargement of abdomen at four or five months is considerable, in case of the solid mole, but where hydatids are present, it often is excessive. There is no foetal motion, no pulsation of the foetal heart. The general health is thought to be more affected, and more previous hemorrhage. Occasionally there is a discharge of colorless, transparent fluid resulting from the bursting of hydatids.*

It has been the custom of authors to denominate all morbid conditions, that produce symptoms analogous to those of pregnancy, false or spurious pregnancies. There are many pathological states, which, by their symptoms, strongly assimilate pregnancy, where that state does not exist at all. The symptoms of approaching menstruation sometimes bear a very strong resemblance to those of early pregnancy, even to the longing for and loathing of food, the morning sickness, salivation, tumefaction and tenderness of the mammae, etc., which all pass off immediately upon the appearance of the catamenia, and recur again at the approach of the next period; but who would think of calling this false pregnancy? We have just as much warrant for this as we have to so misname any other abnormal state, where pregnancy does not exist, but where the symptoms of the two conditions bear some resemblance to each other.

Velpeau mentions: "Retention of menses, ascites, or encysted dropsy, tympanitis, polypi, scirrhus, cancer of the womb, tumors in the ovaries, the tubes of the pelvis, hydrometra, uterine tympanitis, and other lesions besides, which often produce a major part of the rational signs, and even some of the sensible signs of pregnancy." These he arranges under the head of false pregnancy, but says not a word about the blighted and morbid products of conception, retained in the uterus; which alone constitute real false pregnancy. Rigby bestows a full share of attention upon these blighted products under the head of "Mole Pregnancy."

* Churchill on the Principal Diseases of Females.

CHAPTER IV.

PRETERNATURAL OR EXTRA UTERINE PREGNANCY.

PRETERNATURAL or extra uterine pregnancy consists of the fecundated ovum forming an attachment to structures outside of the uterus—and remaining there an indefinite period of time—as to the ovary, and is called ovarian pregnancy, *graviditas ovaria*; the cavity of the Fallopian tube, and is termed tubal or tubarian pregnancy, *graviditas tubaria*; to the peritoneal lining of the abdomen, or some of the viscera, and is denominated abdominal pregnancy, *graviditas abdominalis vel ventralis*.

The failure of the fecundated ovum to be received within the cavity of the uterus is a most unfortunate divergence from the usual course of conception; for it almost uniformly proves fatal to the woman, either suddenly, from internal hemorrhage, or more slowly, but equally certain, from the consequences of inflammation. Tubal pregnancy is generally of shorter duration than either of the other varieties of extra-uterine gestation; it seldom exceeds two months, while the abdominal or ventral variety may continue for several months or even years. Dr. Rigby, in a foot-note to page 118, of his "System of Midwifery," says: "Our friend Dr. Nebel, of Heidelberg, has a preparation of a foetus which was retained for fifty-four years in the abdomen. This is the longest period on record of a foetus being retained in the cyst of a ventral pregnancy."

SECTION 1.—OVARIAN PREGNANCY.

Cazeaux, with many other authors, recognizes the possibility of an internal ovarian pregnancy; that, is where the ovum becomes fecundated in the ovarian vesicle, and remains and is developed there to a certain extent. M. Velpeau regards the occurrence of such an event as impossible, with which view we fully and most unequivocally coincide. In the article on "Human Conception," we have endeavored to show the fallacy of the theory of fecundation being effected in the ovary. If the views there expressed are

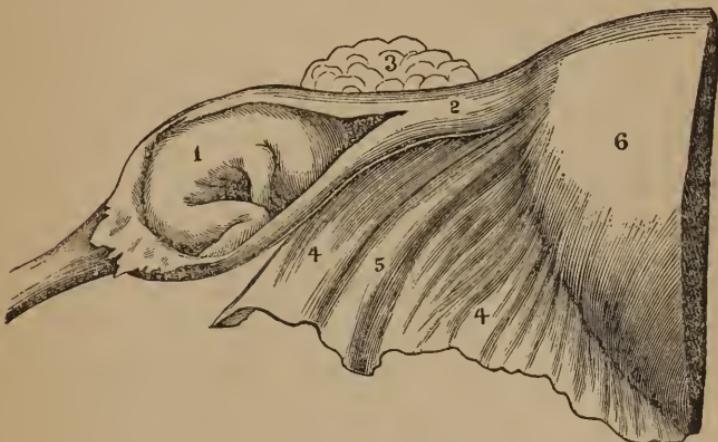
true, it follows that the alleged demonstrations of internal ovarian pregnancy are unreliable. As well might a hard egg be produced to prove it was frozen hard in boiling water, or boiled hard in a cake of ice. The fact of the hard egg will be admitted, but the means of producing its condition might be called in question. Cazeaux, and perhaps most embryologists and modern physiologists, concur in the opinion, based upon actual experiment, that contact of the ovum and spermatozoa is necessary to fecundation. If so, the anatomical location of the ovum, in the Graafian vesicle, would effectually preclude the possibility of such contact being effected while its investments remained entire; then, if the intervening structures, as the peritoneum, the proper tunic of the ovary, the three coats of the Graafian vesicle, etc., prevent the necessary contact, of course fecundation in the ovary becomes impossible, and if there is no ovarian fecundation there can be no ovarian pregnancy. Notwithstanding this plain and inevitable conclusion, drawn partly from his own admission and partly from existing anatomical relations, Cazeaux adheres to the erroneous notion of ovarian pregnancy. He adopts the hypothesis of Boerhaave, and attempts to divide ovarian pregnancy into internal and external. As regards the latter, we can join with him and admit the possibility of its occurrence. That the ovum occasionally becomes fecundated, and is not grasped by the fimbriated extremity of the Fallopian tube, but forms its attachment upon the surface of the ovary, or even within the aperture of the peritoneal covering, between it and the proper coat of the ovary, is not to be disputed; and this last-mentioned circumstance is, undoubtedly, what has been considered internal ovarian pregnancy. There has never yet been recorded a solitary case where a fecundated ovum has been seen in an impregnated Graafian vesicle, either in the animal or human ovary; and the repeated experiments and observations of Coste, Bischoff, Wagner, and others, have clearly demonstrated that such an exhibition never will be seen, because it is impossible for it to occur.

The alleged external ovarian pregnancy is only an instance of abdominal pregnancy. The ovum forms its attachment upon the ovary, instead of some other viscus or part of the abdominal cavity. This variety of extra-uterine pregnancy will be considered in due time.

SECTION II.—TUBAL OR TUBARIAN PREGNANCY.

This consists in the fecundated ovum being arrested in the cavity of the Fallopian tube, and retained there, after having engaged in its fimbriated extremity and traversed a portion of the channel.

FIG. 67.



SHOWING TUBAL PREGNANCY.

1, The foetus; 2, the Fallopian tube; 3, the ovary; 4, 4, the broad ligaments; 5, the round ligament; 6, the right half of the uterus.

It occurs more frequently near the outer extremity of the tube, when the ovum forms its attachment to its lining membrane (Fig. 67). This variety of extra-uterine pregnancy occurs more frequently than either of the others. As the embryo increases in size, the walls of the tube become more and more attenuated, until they finally rupture, which usually occurs about the second month. The increased vascularity of the part, caused by the presence of the ovum, and the increased size of the vessels, supply the means of an augmentation in the circulation, which favors the occurrence of internal hemorrhage; an event that more frequently than otherwise proves fatal. Cases are recorded, however, where the rupturing of the tube has not been attended with such a grave result, but where the patients have survived; and it is suggested that the disengaged ovum may have fallen into the peritoneal cavity, and given rise to peritoneal or abdominal pregnancy.*

* The following case of tubal pregnancy, a preparation of which is preserved in our University Museum, was published in the *University Medical and Surgical Journal* for

Two conditions of the tube may exist, either of which may be the cause of this unfortunate accident: first, a partial obliteration

November, 1864. It is transferred to this work, because it will enable the student to get a much more perfect perception of the phenomena attending the bursting of the Fallopian tube, and the features connected with the fatal result of the internal hemorrhage arising therefrom, than can be communicated by a mere description of such an occurrence:

"Patient was first seen by her medical attendants (Mrs. H. J. Sartain, M.D., and Miss E. Calvin, M.D.,) about 11 A. M., on Saturday, July 9, 1859. She was pillow'd up in bed, unable to endure the recumbent posture—face strikingly thin, pallid and pinched, though said by a friend present to have much of that appearance in her wonted health—skin cold and moist—pulse feeble and flickering—nausea and frequent retching—pains in the chest and back, running whole length of spinal column—extreme tenderness over the right lateral half of abdomen, seeming to radiate from region of right ovary. Bladder emptied freely in the morning—bowels moved then also, and again during our visit—dejections natural in quantity, consistence, color and odor.

In tracing the suffering to the right ovarian region, as the radiating point, the patient said two weeks previously, on account of the heat, she had thrown off her underskirt, and had pain in that spot ever after. She was thirty-three years of age, had been married four years, but hitherto had been childless. If fragility of physique were a guarantee against conception, she might well have been pronounced non-pregnant, but the catamenia had not appeared for six weeks, and her normal period being but three weeks, there was strong suspicion of pregnancy—thus contra-indicating fomentations, which had been used before our arrival.

A combination of tinct. aconite and acet. morphia was directed to be given alternately with small doses of tinct. belladonna.

About five P. M. a messenger came, saying the lady was worse, having difficulty in breathing, etc. Hurrying thither, I found her extremities cold and clammy, the abdomen grown tumid, but little or no other changes; certainly no improvement, except, perhaps, as to the retching. A messenger was dispatched for Mrs. Sartain; meanwhile a mixture of turpentine and sweet oil was rubbed on the abdominal surface, and a hot brick with wet lappings put to the feet. It was clear, to both Mrs. S. and myself, that the case was a desperate one, and the choice of counsel being left entirely with us, we desired A. R. Thomas, M.D., Professor of Anatomy in the Penn Medical University, to be sent for. Brandy and water was given her, when immediately a deathly gasping ensued.

Resort was had to vigorous friction of the hands and feet with brandy, cloths wet with brandy laid on the chest and epigastrium, and frequent moistening of the forehead, nasal and oral regions, with brandy, which seemed to bring her out of that moribund condition, so that she spoke, said she was better, and asked for a drink of water. It was given her, and with perfect ease she swallowed three or four sips, when instantly the same symptoms returned, and despite our most vigorous and persistent efforts, with applications of brandy and friction, she expired before her husband could return with Prof. Thomas. Indisposed for two weeks, seized with severe symptoms at six in the morning, prescribed for at eleven, and before eight in the evening she was dead. Dr. T. approved of what had been done, thought the case remarkable, and suggested the propriety of a "post-mortem examination." It was held on the following Monday. A quart of bloody serum was sponged out of the abdominal cavity, then a pint and a half of black coagula was removed, when the pelvic viscera were exposed. The right Fallopian tube was

of the cavity of the tube, from previous inflammation; and secondly, a disproportion between the size of the cavity and that of the ovum. As the calibre of the tube diminishes gradually from its fimbriated to its uterine extremity, the latter being its most contracted part, and the ovum probably enlarged somewhat by fecundation, it would not be surprising that, in its transit, it should meet with sufficient obstruction to arrest its passage and produce the difficulty under consideration.

3. *Symptoms.* The symptoms of tubal, as well as those of the other varieties of extra-uterine pregnancy, are similar to those of ordinary gestation, though often more violent. The abdomen enlarges, in the latter, as the foetus increases in size, there is an enlargement of the uterus, and a sensation of heaviness in that region; as the state advances, there is not maintained a correspondence, between the size of that organ, the condition of the cervix, and the time of the supposed pregnancy—there being a marked deficiency in its volume, for the time, or it may resume its non-gravid size, while the abdomen goes on increasing. In the tubal, the symptoms are in common with the other varieties, save the abdominal enlargement. We have the obstructed menses, the promi-

found enlarged and ruptured within an inch of its connexion with the uterus. The ovule had lodged in the tube about half an inch from its outlet, and there formed its attachments. The oozing blood from the ruptured arterioles and venules of the tube had destroyed the outline of the embryo, leaving a sort of granular debris lying in the fragments of the membranes, which were detached from the inner surface of the tube. The nidus measured externally about an inch in length, and three-quarters of an inch in transverse diameter. The walls of the uterus were slightly softened, and the decidua had formed. The cervix uteri had been elongated, then flexed forward, the flexure being about half an inch from the os.

The corpus and fundus were in the normal position. To this alteration of the cervix the suffering usually experienced during the menstrual nisus had probably been due.

E. CALVIN, M. D.

For the foregoing interesting case, we are indebted to the kindness of Mrs. H. J. Sartain, M. D., one of the attending physicians. It was written out at the time it occurred, by the amiable and talented lady whose signature we have appended to it, who fell a victim to consumption about a year and a half ago. Her early death was hastened by her self-sacrificing devotion to her professional duties. The article, which has lost none of its interest from age, was refused publication at the time, by the Philadelphia medical journals, because it was reported by a female physician. In this way the profession loses many a bright gem, because of the stupid obstinacy of those who assume the umpireship of mind, and presume to decide what kind of knowledge is proper for its members.

EDS.

nent and tender mamma, the morning sickness, the fastidious appetite, etc. The woman is taken early with a pain in one side or the other, in the iliac region ; sometimes it is severe, at others it is quite moderate ; but gradually gets worse and worse, until it terminates in the rupture of the tube, which event is announced by the presence of all the symptoms of excessive loss of blood—as the pallor and pinched-up appearance of the countenance, the skin cold and clammy, pulse feeble and irregular, nausea and retching, pain in the back, etc., with extreme tenderness in the side affected, from which point the more diffused abdominal distress, seems to radiate. In a short time the feet and legs become cold, the abdomen tumid, and death closes the scene.

Cazeaux gives ten varieties of extra-uterine pregnancy, as arranged by M. De Zeimeris, as follows :

1. The ovarian pregnancy.
2. The sub-peritoneo-pelvic pregnancy.
3. The tubo-ovarian pregnancy.
4. The tubo-abdominal pregnancy.
5. The tubal pregnancy.
6. The tubo-uterine interstitial pregnancy.
7. The utero-interstitial pregnancy.
8. The utero-tubal pregnancy.
9. Utero-tubo-abdominal pregnancy.
10. The abdominal pregnancy.

After all this subdivision, it only amounts to this :—1st, Ovarian pregnancy, of which we have already disposed ; 2d, tubal pregnancy, which we have fully considered ; 3d, the utero-interstitial pregnancy, which consists of the development of the embryo in the substance of the uterine walls ; and 4th, abdominal pregnancy, to which all the other so-called varieties properly belong. If the embryo is neither developed in the Fallopian tubes, nor in the substance of the uterus, and is extra-uterine, it must of necessity be in the cavity of the abdomen. Every accidental point of attachment, affords a name for an imaginary class or variety of extra-uterine pregnancy. There are strictly but three classes. 1st, that which occurs most frequently, is the tubal ; 2d, that which occurs next in frequency is the abdominal ; and 3d, the one that is met with the most seldom is the interstitial. There is one strange freak, how-

ever, that is said to have transpired several times, which is denominated *utero-tubo-abdominal pregnancy*—it is where the placenta has been found in the cavity of the uterus—the cord occupying a part of the cavity of the tube, and the foetus in possession of the cavity of the abdomen. A case of this kind is related by De Zeimeris,* which is purported to have occurred July 10th, 1763, and is told with an air of truth, that is well calculated to captivate the credence of the credulous, while it is in direct antagonism to everything like probability.

SECTION III.—ABDOMINAL PREGNANCY

Is where the fecundated ovum forms attachment within the abdominal cavity, exterior to the uterus, and the cavity of the Fallopian tubes, and disengaged from the substance of the uterine walls. It is caused by a failure of the fimbriated extremity of the Fallopian tubes to grasp the ovum as it escapes from the ovary; it may attach itself to the ovary, the broad ligament, the small intestines, or any other part with which it may come in contact in its fall from the ovary. It occurs less frequently than the tubal variety, and sometimes continues to the full time, and even longer. The foetus is enveloped in its membranes, and is supplied with cord and placenta. The uterus undergoes some modification, in the condition of the neck, and the size of the organ, and is furnished with the decidua. The walls become softer and more spongy, resembling their condition in true pregnancy. There being no means of escape, the foetus sooner or later dies, and by decomposition becomes a mass of putrid matter, causing a fatal peritonitis, or from the absorption of the disorganized remains, causes death from pyæmia, or some other constitutional degeneration. It occasionally happens, that an abscess forms, from the local inflammation induced by the presence of the irritating mass, which opens into the rectum or vagina, and thus affords an outlet to the disorganized matter; but where the abscess opens externally, through the abdominal parietes, the removal of the offending mass is completed with much greater ease and safety to the patient, than by any other means. In some instances the tumor has been opened, and the remains of the partly

* Cazeaux, foot note, page 148, *Midwifery*.

decomposed foetus and large quantities of putrid pus have been removed.

"Cases of ventral pregnancy have been recorded, where the child has remained in the mother's abdomen without producing any dangerous symptoms, and when she has again became pregnant the natural way. The earliest instance of this sort was recorded so long ago as Albucasis" (an Arabian physician and surgeon, who lived about the beginning of the twelfth century).

"A very interesting case of this nature is described by Dr. Bard, of New York. (Med. Obs. and Inquiries, Vol. II., pp. 369.) It was the patient's second pregnancy; at the end of nine months she had pains, which after a time went off; the tumor gradually diminished somewhat, and in about five months after she conceived again, and in due time was delivered, after an easy labor, of a healthy child. Five days after delivery she was seized with violent fever, a purging, suppression, pain in the tumor, and *profuse fetid sweats*; an abscess formed in the abdomen, which was opened, and a vast quantity of extremely fetid matter was discharged; the opening was enlarged, and a foetus of the full size was extracted. Dr. Bard 'imagined the placenta and funis umbilicalis were dissolved in the pus, of which there was a great quantity.'"^{*}

For the following curious interesting case I am indebted to the kindness of Dr. J. N. Fiester, one of the graduates of our University, who, writing under date of March 27th, 1867, from Newton Falls, Ohio, says: "As it is sometime since the death of Mrs. B. and the post-mortem examination, I cannot give so definite a description of the case as I could have done had it been more recent. She was thirty-three years of age when she died, fifteen years previously she gave birth to her first child, a daughter, who is still living. In consequence of a much deformed pelvis, she subsequently avoided having children at term, and has frequently submitted to the induction of abortion. Thirty-three months previous to her death she again experienced symptoms similar to those of pregnancy, amongst which was a suppression of the catamenia. Three months after the discovery of these symptoms, she again (as usual) submitted to an attempt at abortion, by rupturing the membranes, or disturbing the supposed intra-uterine

* Rigby's System of Midwifery.

connections, but without the accustomed success. The abdomen kept increasing in size, and at the expiration of six or seven months, a tumor could be felt through the right abdominal parietes. At the end of nine months she was not as large as pregnant women generally are at that period. She suffered much pain. In the earlier stages of her troubles she had pain in the right side, over the seat of the tumor, and on the right side of the spinal column opposite the tumor. From about the tenth month until her death she had more or less pain, the first of which were similar to those of labor. The last ten or twelve months of her life, she suffered constantly; so much so, that she had to be kept almost constantly under the influence of opiates. In the last stage of her sickness her abdomen was very large and irregular in shape. A few days before her death, it ruptured about two inches below the umbilicus. From the appearance of the patient, I judge that she discharged fully two gallons of a viscid and very offensive fluid, under which she sunk. Upon making a post-mortem examination, found the peritoneum lining the walls of the abdomen thickened, very rough and of a blackish color, indicating excessive inflammation also considerable decayed tissue was found scattered over the entire intestinal mass. A tumor, about the size of a man's fist, devoid of any membranes and wholly detached from any of the surrounding structures, consisting of hair, which, when cleaned and dried, weighed fifty-five grains, and a brain-like substance. It was found in the pelvic cavity on the right side of the uterus. No traces of bones could be found. Neither the uterus nor its appendages were examined."

This case is very peculiar, inasmuch as it shows, that the brain and hair were the only parts of the foetus that resisted the action of the solvent powers that dissolved all the other structures, even the bones. The hair and this brain-like substance were matted together, the scalp and bones of the skull which originally separated them having been destroyed. Dr. Fiester very kindly presented me with twenty-five grains of the hair, the properties of which are very unusual. It is what may be termed of rather a sandy color, having neither the soft and fine texture of that of the head, nor the short and coarse character of that of the pubis. It is very long, some of the hairs measuring over twelve inches.

From its appearance, it might be fair to infer, that while its surroundings were destructive to the general tissues of the foetal organism, they contributed largely to its growth. It has a stronger similitude to human hair than to that of any animal, but is unlike the filamentous growths upon any part of the human body; perhaps its peculiarity is due to the modifying influence of the fluids, in which it has so long been macerated.

In speaking of extra-uterine pregnancy, Dr. Burns says: "Very foetid matter, together with putrid flesh, bones and coagula, are discharged through the abdominal integuments, or by the rectum, vagina or bladder. Sometimes even an entire foetus has been brought away from the umbilicus, or by the rectum. It is worthy of notice, that the placenta in this process is ultimately destroyed and discharged through the putrid fluid. Often time is not allowed for this process to be accomplished, but the person dies at an early period."

"Thus it appears, that there are different terminations of the extra-uterine pregnancy. But the most frequent one is that of inflammation, ending in abscess, attended with fever and pain, under which the patient either sinks, or the foetus is expelled in pieces, and the cure is slowly accomplished. From a review of cases, it appears that a majority ultimately recover, or get the better of the immediate injury."

As every operation in physiology, or rather, the performance of every function in the animal economy, is liable to accident or misdirection, it is not at all surprising that this one should not be exempt from the general liability, especially as the action of the tube is so entirely reflex in its nature, and subject to so many influences, physiological, pathological and mechanical, calculated to interfere with its normal movements; the wonder is, rather, that the accident of extra-uterine pregnancy does not occur more frequently than it does; there can be but little doubt that it would, if all the fecundated ova that escape, and fail to enter the tubes, but fall from the ovaria, formed attachments to the abdominal structures with which they accidentally come in contact. But the presumption is, that very much the larger number of them perish for want of proper sustenance; and being so very small, and composed of a bland fluid, enclosed in an exceedingly thin and delicate

membrane, their presence, while unconnected, is incapable of exciting any degree of irritation, at all injurious or even perceptible. Hence it is not until the attachment is formed, and the placenta developed, that the gravity of the accident becomes apparent. Dr. Burnes is of the opinion that, in many instances, this variety results from ruptured uterus.

SECTION IV.—INTERSTITIAL UTERINE PREGNANCY.

This is where the fecundated ovum enters the tube, and traverses its cavity until it arrives at that part that penetrates the uterine substance ; here it leaves the tube and works its way amongst the fibres of the uterine structure. It is difficult to account for this strange divergence of the ovum from the natural course of the tube ; but it has been suggested, that it is owing to an abnormal enlargement and aperture in some one of the vessels that supply the lining membrane of the tube, into which the ovum enters, and which it traverses, until it becomes obstructed by the diminished size of the said vessel. It has been found in this situation, with a perfect cyst enclosing it, and with all the constituents of a perfect ovum.

"The following is a summary, presented in the *Bibliotheque Medicale*, of the cases hitherto recorded :

1. A case published in 1801, by Schmidt, in the sixth week of gestation.
2. A case published in 1811, by Albers, at two months and a half.
3. A case published in 1817, by Henderich, at three months.
4. A case published in 1821, by Henderich, at eight months.
5. A case published in 1823, by Bellemain, at three months.
6. A case published in 1825, by Dance, at three months.
7. A case published in 1825, by Moulin, at two months and a half.
8. A case published in 1825, by Auvity, at four months."*

In regard to the part of the uterus, that is the most frequent recipient of the vagrant ovum, and the means of its getting there,

* Dewecs' System of Midwifery.

Velpeau says: "In five out of seven cases it has been found on the left side, above, behind, before, or below the tube, which did not, in any case, as we are assured, communicate with the cavity that contained the production."

Diagnosis. Perhaps the accoucheur could not undertake a more difficult task, or one promising less success, than to make a correct diagnosis in regard to the presence of extra-uterine pregnancy, in any stage of its existence, or with respect to either of the varieties under consideration.

1. In regard to its existence. How shall it be determined? During the early months there are no means by which this accident can be distinguished from true pregnancy. In some instances there is the suppressed catamenia; in others this function does not appear to be disturbed, where it is suppressed, and other symptoms of gestation are present, the inference is a normal pregnancy. Where it is not suppressed, and the other symptoms, as morning sickness, longing for and loathing food, mammary modifications, etc., are present, the inference is no pregnancy at all, the presence of the menses would obscure the diagnosis, and the other symptoms would be regarded as the result of some pathological condition of the uterus, or ovaries, and conception would be very likely to be overlooked. Sometimes the morning sickness and capricious appetite are both absent in true pregnancy, and the suppressed menses and mammary change are the only early symptoms present. The same may be the case in extra-uterine conception. In some instances, where all or more of the early symptoms are experienced, they are more severe in the latter case. But they are not uniform in their degree of severity in normal gestation. In some instances they are severe, while in others they are mild. We therefore conclude that there is no means of determining with any degree of certainty whether extra-uterine pregnancy exists or not from the early symptoms.

In the tubarian variety, we may have all or most of the early symptoms of pregnancy, and in addition a pretty constant pain and tenderness in the iliac region of one side or the other, which continues to increase in severity as pregnancy advances; and at about the second month, when the local suffering is very intense, the patient suddenly manifests alarming symptoms, such as indi-

cate excessive loss of blood, the terrible truth as regards her situation, becomes revealed, and in a few hours she expires from internal hemorrhage.

In the interstitial variety, similar local symptoms, but rather less severe, may be present, with the usual evidences of pregnancy. In this case also the cyst containing the embryo bursts about the same time, and may be attended with like results, but cases are recorded of the foetus escaping into the cavity of the uterus or abdomen, and the woman recovering.

In cases of the abdominal or ventral variety, there are better chances to make a more accurate diagnosis, because it is unusually of longer duration. What has been said in regard to the early symptoms, is equally as applicable to this variety as to either of the others. It is not until the case becomes further advanced, that any particular diagnostic marks present themselves, and even then they are often very obscurely developed. The abdominal tumor is less, in proportion to the time, than in normal uterine pregnancy; it is more irregular, it is more upon one side; the foetal movements are felt in more different places, etc. As in Dr. Fiestu's case, the woman at term is not so large as pregnant women usually are at that time; and further, labor does not come on at the proper time, but apparent gestation goes on to an indefinite extent, and the catamenial suppression, secretion of milk, etc., continue for months and years after the allotted time for parturition. The foetus finally perishes, followed by inflammation, abscesses, suppuration and death.

The prognosis is always unfavorable, in every variety of extra-uterine pregnancy, notwithstanding the opinion of Dr. Burns, that a majority of the cases, either partially or entirely recover.

Treatment. We can only hope to ameliorate symptoms, without being able to remove the cause, even could we be certain of its existence. For to attempt the removal of the foetus by gastrotomy, would be a most hazardous, and unjustifiable undertaking, even in the ventral variety, and at nine or ten months, and under circumstances where a wrong diagnosis would be impossible, and where the circumstances were the most favorable. The separation of the placenta from the serous structures to which it must necessarily be attached, would place the woman's life in greater jeopardy than to

trust to the chances of its spontaneous death and decomposition, and a removal by suppuration.

Cazeaux advises venesection, copious and often, for the double purpose of destroying the foetus and preventing congestion. Burns, Rigby, and others, recommend blood-letting, as a means of subduing inflammation. Even if we could be certain of the real condition of the patient at an early day, it is extremely doubtful if either object had in view by Cazeaux could be attained by the means he recommends, unless it were carried to an extent destructive to the strength and vital powers of the patient. Where it is employed as a means of reducing the inflammations induced by the presence of the foetus, or the irritating fluids arising from its decomposition, its use is equally objectionable. So long as the exciting cause exists the irritation or inflammation will continue, until it runs to its termination in suppuration or gangrene, and every attempt to control it by general depletion, will only prolong the process, without the possibility of ultimately arresting it, while the strength of the patient is being more impaired by the remedy than by the disease. The pain that may be present, whether it be at the second month or second year, is purely local, the effect of a local cause, and requiring local treatment. Leeches over the seat of the pain, followed by warm fomentations, or counter-irritants, succeeded by a hot pack, and opiates to allay pain, is about all that can be done to insure relief. The bowels must be kept soluble; and if febrile symptoms manifest themselves, they must be met by appropriate diaphoretics. In the more advanced stages, should the death and decomposition of the foetus, and the formation of an abscess or abscesses become apparent, warm poultices should be kept constantly applied over the part most affected, with a view of promoting suppuration, and directing the pointing to the surface. Should the abscess open into either of the cavities, and puss and decaying portions of the foetus be discharged, the opening must not be allowed to become stopped up with pieces of flesh, but they must be removed as often as they present themselves; and often portions of the skeleton, especially the long bones and the bones of the cranium, cause a great deal of suffering in engaging in the aperture, and require to be removed, even by enlarging the orifice,

if necessary. During the suppurative process the strength of the patient must be kept up by tonics, generous diet, stimulants, etc. If the abscess opens externally the putrid contents of the abdomen pass off much more rapidly, and the prospects for a favorable termination are very much enhanced.

PART SIXTH.

CHAPTER I.

THE DIAGNOSTIC SIGNS OF PREGNANCY.

THE accoucheur is often called upon to decide the question of pregnancy, under circumstances of great importance, both in the married and unmarried female. Health, happiness, reputation and even life may be involved in the decision. The obscurity and uncertainty that invest the condition frequently render a correct diagnosis exceedingly difficult, even to the most experienced and skilful. Sometimes the signs are so well marked and decisive that they proclaim the condition with the most unerring certainty; at others, during the early months, they are so very obscure and complicated with pathological symptoms, that the most rigid scrutiny and careful examination result only in doubt and uncertainty, often leading to grave and ruinous mistakes. How often are the most tender feelings deeply wounded by the mere suggestion of a suspicion, involving the sacredness of character, though done in the most delicate manner? Youth, innocence and chastity, united with a proper self-appreciation, form a combination of qualities not to be assailed with impunity, by even the slightest touch of suspicion.

And the most disastrous consequences have resulted to health and life from a wrong diagnosis. How often has pregnancy been mistaken for dropsy, and the trocar ruthlessly plunged into the gravid uterus, with the view of drawing off the supposed serous accumulation from the abdomen? Such instances are not rare,

even in the practice of experienced, and generally reputed intelligent and skilful physicians. Such an instance came under my own observation, that was done by direction of one of the most distinguished professors of surgery of this city.

Such blunders are due, partly to carelessness and lack of a proper estimate of the value of human life, and perhaps more frequently to the obscurity of signs and symptoms of pregnancy; but where this is sufficient to leave a doubt, in regard to the real condition of the patient, either pro or con, no man is justifiable in resorting to such decided measures, while that doubt remains. He had better take a non-committal position, and wait until time shall produce the necessary revelations, to enable him to decide with certainty and act with judgment.

Again, another difficulty in the way of a correct diagnosis arises from the inveterate obstinacy with which the patient often clings to falsehood. No argument, threat or persuasion can extract from her an admission of the probable cause of her symptoms, or of any knowledge relative to her situation. To illustrate with what pertinacity they sometimes adhere to this assumed ignorance, I will mention a case that occurred some time ago. It was a young girl, whom I was called upon to decide in reference to suspected pregnancy. The signs were well marked and distinct; I gave it as my decided opinion that such was the case. She denied it in the most peremptory manner. I called upon her several times during her pregnancy; she still adhered to her denial with all the vehemence imaginable, insisting that the suppression of the menses, enlargement of the abdomen, etc., came from cold she had taken; denied that there was any foetal movements, and that there was any change in the mammae, which she refused to show, etc. Finally labor came on in due time, and when it arrived to a high degree of advancement, in the very midst of her suffering, she denied it still, declaring she had the colic; and false to the last, even when the child was born and cried lustily, she protested that it was not hers. The positive denials, especially when the signs are few and obscure, or complicated with disease, add to the difficulty and uncertainty of the diagnosis, to the extent of our belief in their truthfulness.

In making a diagnosis of pregnancy, in case of an unmarried female, due weight should be given to the character, standing and

associations of the patient; these must be considered as affording some protection to innocence and purity; but when put in the balance against a combination of well-defined symptoms, and the acknowledged phenomena of pregnancy, they must be declared wanting. However much we may desire that her relations to society, and symptoms, for the sake of her own social position and peace of mind, and the reputation of her family, may vindicate her character, we must not close our eyes against the undeniable evidences of existing facts; and when perfectly satisfied, let the communication of our convictions be made to her, privately, and in as kind and feeling a manner as possible, with the expression of our regrets that so sad a misfortune should have befallen her. She is first to suffer, and to suffer most, and it is for her to direct whether we are to communicate her condition to another, as a parent or confidential friend, or not; and when we shall have, by kindness and sympathy, gained her confidence and received an acknowledgment of her impropriety, and been entrusted with the secret that has laid with a crushing weight upon her poor tortured soul, we are bound, by every consideration of honor, professional and social, to keep it faithfully and guard it inviolate.

Authors have divided the signs of pregnancy into two classes, viz., Rational and Sensible, which division is not considered sufficiently definite and explicit, but too vague and complicated, to admit of a clear and exact understanding of what constitutes each class of signs.

1. The strict signification of the term Rational, is that which is consistent with reason, or agreeable to reason. Hence rational signs of pregnancy are such as would reasonably lead one to believe that pregnancy exists. Now, there is not a single acknowledged sign of pregnancy, whether classed with the rational or sensible signs, but would reasonably lead one to believe that the condition of pregnancy was present, as amongst the latter, those revealed by the touch, go to strengthen the reason for the belief in the fact; so, also, in regard to the foetal motion, the sound of the foetal heart, etc. 2. And as regards the sensible signs: The definition of sensible is, 1st, Having the capacity of receiving impressions from external objects; capable of perceiving by the instrumentality of the proper organs; 2d, Perceptible by the senses;

3d, Perceptible, or perceived by the mind; 4th, Perceiving, or having perception, either by the mind or the senses, etc. Any of the signs mentioned as the rational ones, as the suppression of the menses, morning sickness, capricious appetite, etc., are as much perceived by the action of the mind, as the others are by the sense of feeling, hearing, etc. Hence, both classes come under either definition with equal propriety—which the intelligent student readily perceives, and finds himself overwhelmed in embarrassments, from which he is unable to extricate himself in any *rational* or *sensible* manner, but is obliged to depend entirely upon his memory, to retain in his mind the arbitrary division, as given in the books. The divisions he is required to study and comprehend, admit of the application of no principle or philosophical theory to aid him, but parrot-like, he is required to repeat what is taught to him by rote. This system of teaching might have answered in those days when authorities were placed before reason, and dogmatism before thought. Instead of following the beaten track our fathers trod, we will take the liberty of making a slight divergence, more, as we believe, in the direction of reason and scientific accuracy.

Taking the signs of pregnancy as they are presented, we can readily recognize *three natural* divisions, viz.: 1st, The physiological, which includes all the physiological changes that result to the woman from pregnancy—this being a physiological condition, all the results of it upon a healthy organism must necessarily be physiological; 2d, The physical, which includes all the appreciable phenomena pertaining to the product of conception, whether produced by the foetus itself, or by exterior agencies, as its active and passive movements, etc.; 3d, The psychical, which includes all the changes effected in the mental condition of the woman by pregnancy.

SECTION I.—THE PHYSIOLOGICAL.

In studying the physiological signs of pregnancy, they will be presented, as nearly as possible, in the order of their occurrence:

1. *The Suppression of the Menses.* The event that kindles a glow of joy in the breast of the hopeful candidate for maternity, and clouds the mind of the fearful one with perturbation, is first

heralded by the absence of the catamenia at its appointed time. While this, as a rule, is the result of a physiological law, there are many exceptions to it; that is, the suppression of the menses is by no means an infallible proof of pregnancy. The causes of a pathological suppression are so numerous, and are so often productive of the result, that the bare fact of its absence, unsupported by other and corroborating testimony, should be received with a great deal of caution. But where the woman is married and healthy, and when the menses fail to appear at the regular time without any known cause, and such failure is not attended with any unpleasant symptoms, as headache, pain in the back, fever, etc., it is sufficient to excite inquiry in reference to other signs pointing in the same direction, and where the patient is unmarried, to create suspicion that she knows more about the cause of the suspension than she is willing to admit.

While the menses may be suppressed, and there be no pregnancy, it very seldom happens, that women menstruate after conception, and during pregnancy, therefore the absence of menstruation is a sign of pregnancy, of great value, which is very much enhanced by the appearance in due time of other symptoms, showing a functional disturbance of sympathising organs. There are many strange aberrations connected with the function of menstruation, which, when taken, in connection with pregnancy, baffle all the skill of the physiologist to reconcile them to the laws of ovulation, as established by modern experiments and observation. In some women the menstrual function is not disturbed, apparently, during the early stages, by pregnancy, but they go on menstruating regularly for two, three, or four of the first months, and then cease for the remainder of the term. Others continue to menstruate during the whole period of gestation. An instance of this kind came under my observation some years ago—the woman menstruated regularly every month during pregnancy, and was the mother of five or six children, all of whom were born thin and delicate, and never came to be plump and well developed, like other children. Several cases, stranger still, are recorded in the books, of women who appear to be wholly exempt from menstruation only during pregnancy, and who have their courses regularly at such times. A most remarkable case of the kind is given by Dewees and cited

by Rigby, from whose work we extract it: "A woman applied for advice for a long-standing suppression of the menses; indeed, she had never menstruated but twice. She had been married a number of months, and complained of a good deal of derangement of the stomach, etc. We prescribed some rhubarb and steel pills; about six months after this she called to say that the medicine had brought down her courses, but that she was more unwell than before. The sickness and vomiting had increased, besides swelling very much in her belly; we saw this pretty much distended, and immediately examined it, as we suspected dropsy; but from the feel of the abdomen, the want of fluctuation, and the solidity of the tumor, we began to think it might be pregnancy, and told the woman our opinion. On mentioning our impression, she submitted to an examination per vaginum; this proved her to be six months advanced in pregnancy. After this she had the regular return of the catamenial period, until the full time had expired; during suckling she was free from the discharge. She was a nurse for more than twelve months; she weaned her child, and shortly after was again surprised by the eruption of the menses, which, as on the former occasion, proved to be a sign of pregnancy."

Baudelocque says: "I have met with several women, who assured me that they had not had their menses periodically except during their pregnancies; their testimony appeared to me to deserve more credit, because they only applied for an explanation of this extraordinary phenomenon."

Velpeau remarks that, "the continuance of the menses after fecundation, is found occasionally to be almost epidemic, or at least, much more frequent in some years than in others." Desormeaux makes a similar remark.

Notwithstanding these deviations from the usual course of things, a suppression of the menses, in women, hitherto regular and under favorable circumstances, and unaccompanied, or not followed by any abnormal symptoms, may be regarded as a pretty sure sign of pregnancy, in a very large majority of cases.

2. *Morning Sickness and capricious Appetite.* Where a suppression of the menses is the result of pregnancy, it is followed in the course of a few days by a sensation of nausea, immediately upon rising in the morning, which gradually increases from day to

day, until it eventuates in retching and emesis, during which a small quantity of viscid or watery matter is ejected, with an acid, acrid, bitterish or saline taste, after which perfect freedom from it is experienced, until the next morning. This continues for three or four months and gradually passes off. Sometimes there is an exemption from this until the patient takes her seat at breakfast; the first few mouthfuls received in the stomach excites the sickness, when she is obliged to leave abruptly and eject it, after which she can take her meal with the usual relish. In some cases the sickness is not confined to the morning, nor to the first few months, but throughout the whole day and the entire term, the patient is the constant subject of the most distressing nausea, with frequent turns of vomiting, which nothing can assuage or modify.

The lesion of digestion during pregnancy does not stop here. The appetite is often as wayward as the stomach, and not unfrequently loathes with an unutterable abhorrence, many articles of food, which at other times it accepts with pleasure. Even the smell from the cook's department excites nausea and disgust. On the other hand, it voraciously demands many kinds of food and drink that it has no particular desire for, in the non-gravid state, nor are its vagaries confined to a regimen at all times reasonable and proper, for the most disgusting substances are longed for, as a piece of untanned hide, old shoe soles, or the most filthy refuse of the kitchen. Chalk, charcoal, and even the hard anthracite, are often masticated with avidity. In some, the appetite is never better, more regular, or natural, than when pregnant. In others again, there is anorexia, or the appetite is exceedingly delicate and fastidious, not especially loathing, nor even demanding any particular articles of food, but is generally deficient during the whole term.

Sometimes the demand for intoxicating liquors is inordinate, and only to be appeased by gratification. The quantity that can be taken, under such circumstances, with perfect impunity, is utterly incredible. Intoxication appears to be entirely out of the question. After the appetite has been once thoroughly satisfied in this respect, there is no farther craving, and it remains at perfect ease. There is no question of morality or propriety to be entertained against the indulgence here demanded. This inor-

dinate longing appears to be but the expression of a physiological necessity for stimulation, which, when once satisfied, ceases altogether, and with it, the great distress and suffering it induced. Moreover, there is a popular idea extant, that when this longing for liquor is allowed to go ungratified, it is likely to transmit to the offspring a hereditary desire for the same indulgence, from the ruinous consequences of which, it will ever be found difficult to escape; and from our own observations, and those of others that have been communicated to us, we are not disposed to treat the matter with indifference. It is admitted on all hands that pathological tendencies are transmissible from parents to children. We know also that both mental and physical peculiarities are so transmitted, and we know no reason why this, or any other physiological or mental condition upon which the mind of the mother dwells intently and continuously for a length of time, during gestation, should not in a similar way make its impression upon the offspring. We know that medical writers have generally, heretofore, discarded such views, mainly because they could not explain their rationale. But even professional pride must bow to the truth of the aphorism, "That there is yet, more in heaven and earth, than their philosophy has dreamed of."

Such freaks of the stomach and appetite are not exclusively confined to pregnant women, they are frequently met with in young girls, a few days previous to their menstrual periods—and when the function is interfered with from other causes than pregnancy. And a similar state sometimes arises from imperfect digestion, and the presence of abdominal tumors, etc. But when connected with pregnancy the symptoms are more intense and of a longer continuance, except where they are mitigated or removed by the longing being gratified, which is always advisable, where the article craved is known not to be absolutely injurious.

Symptoms of indigestion as pyrosis or heart-burn, sour eructations, etc., are amongst the gastric disturbances in early pregnancy; constipation or diarrhoea is also a frequent accompaniment, which often continues throughout the term. Sometimes, nearly or quite simultaneously with the morning sickness, and other gastric disturbances, there is a copious secretion of saliva, which is emitted in small white, frothy globes and with great frequency,

so much so, as to be extremely annoying. This is also occasionally met with in unmarried women, towards the approach of each catamenial epoch. But it is then comparatively slight and of short duration. It is more frequently present during abnormal suppression.

3. *Flatness of the lower Abdomen and depression of the Umbilicus.* Very early in pregnancy, may be observed a sinking of the hypogastric region, so as to present an unusual flatness. It is caused by the sinking down of the uterus in the pelvis, and the space previously occupied by it, being filled by the small intestines. These changes in the position of these viscera cause a corresponding caving in of the abdominal walls, hence the French proverb, *à ventre plat, enfant il ya.* "Where there is a flat belly, there is an infant." The bladder being attached to the uterus by its anterior face, and to the umbilicus by means of the urachus, as the latter descends lower into the pelvis, it drags the bladder down also, and thus drawing upon the umbilicus, causes the depression, which is valuable as a diagnostic sign of pregnancy, because it is constant. Pregnancy cannot exist without it. It may, however, sometimes be obscured, in an imperfect degree, and of variable duration, connected with ordinary prolapsus. But its uniform occurrence, its persistence until about the third month, and the regularity of the circle, in connection with one or both the foregoing signs, render it one of great reliance. A case illustrating the value of this sign, recently came under my own observation. It was that of a young woman, unmarried, who had missed her courses for three months, which was accompanied by a combination of symptoms, that fully justified the suspicion of pregnancy. These were nausea, vomiting, longing, loathing, lassitude, salivation, enlarged and painful mammae, etc. But during the presence of all these, the abdomen and umbilicus remained unchanged, except from occasional and transient inflations from gas. This was the only redeeming one, in the group of physiological signs, indicating pregnancy. But by the use of iron, and other appropriate treatment, the catamenia was restored, upon which there was a prompt subsidence of all the symptoms.

4. *Modifications in the Mammæ and Nipples.*—Scarcely have the foregoing signs begun to manifest themselves, before a marked change begins to be developed in the breasts—they gradually in-

crease in size, and firmness, and become more or less painful, and sensitive to the touch. This change often goes on rapidly for the first three or four weeks, then it is continued more slowly, until about the end of the third month. They then remain nearly stationary until about the seventh month, when they again begin to enlarge, and increase in soreness and continue so until the close of gestation. About the fifth or sixth month, or perhaps earlier, large blue veins may be observed in the skin, sending off branches towards the nipples.

The areola, which, in the virgin, consists of a circular disk of about an inch and a half in diameter, surrounding the nipple, is of a light rose or delicate flesh color; the skin here has the appearance of being much thinner, and of a firmer texture than that of the other parts of the organs. After conception, this circular space begins very gradually to change its character and appearance; the color begins to grow a shade darker, which increases from week to week without abatement until it becomes quite dark, and, in some instances, nearly black. About the fourth month the change is very decided; at the second month it is easily perceived by its brownish hue. In the brunette this change of color is much more decided at every stage of pregnancy than in the blonde; indeed, in the latter there is sometimes no perceptible change whatever from the commencement to the close of pregnancy. In every grade of difference between these two complexions, there is a corresponding difference in the shade of the areola at all periods of gestation. The skin forming the areola very early after conception presents an elevated appearance, and communicates to the touch the sensation of emphysema. This is caused by an infiltration of fluid into the subjacent cellular tissue; the areola often becomes bedewed with moisture, so much so as to moisten and discolor the under-linen. The nipples being erectile in their character, sympathize with the breasts and become more prominent and turgid during the early period of pregnancy than before; their color is between that of the areola, and the skin on the other parts of the mammae, and of a reddish hue; they continue erect and prominent during gestation, and towards the latter part allow of the escape of colostrum, sometimes in considerable quantities. The areola is studded very early with a number of small

papillæ; they are most numerous immediately around the nipples, and consist of enlarged sebaceous follicles. They are always present with the other mammary modifications incident to pregnancy.

All the foregoing changes in the appearance and condition of the mammae, areola and nipples, are sometimes present, to a small extent, in virgins, and are the forerunners of the catamenial visitations. They are of short duration, and begin to subside upon the appearance of the menses at each period. They are all much less in degree, than when they accompany gestation. The areola, under such circumstances, is but slightly changed in color, but enough so to make it perceptible. It often becomes decidedly darker from pathological conditions of the uterus and ovaries, and sometimes from general ill-health. In this case, the change progresses more slowly, and seldom reaches the height it does from pregnancy. When the discoloration occurs from pregnancy in the brunette, it does not entirely subside, but continues sufficiently marked to render it of no service in determining a subsequent pregnancy. Its presence in a healthy woman, in connection with the other signs, though they be but slightly developed, may be regarded as one of the most certain signs of pregnancy.

5. *Modification of the Urine.* The change effected in the urine by gestation was recognized by the ancients, and frequently made the subject of observation by their authors. Avicenna has, perhaps, given a more detailed description of the peculiar changes thus effected in it than any of his contemporaries. For a number of centuries, however, it was overlooked, and no particular attention was paid to it until the subject was again revived within our own time.

When first voided, it is slightly cloudy, and of rather a whitish color, but after standing a short time, the microscope reveals small white corpuscles floating in it, which presently settle in the bottom or upon the sides of the vessel in the shape of a sediment, leaving the fluid clearer and more transparent. Without a further analysis this property cannot be referable to the gravid state as one of its products, as there is nothing more common than a similar appearance of the urine under almost any trifling derangement of the system; and very often the urine presents quite a turbid and

thick appearance and deposits a heavy sediment while persons are in apparently a pretty good state of health.

M. Nauché, of Paris, in experimenting upon the urine of pregnant women in 1831, discovered a substance not recognized before, which he called Kyesteine, (from *κυησίς, εώς, kyesis, pregnancy, eos, early, early pregnancy.*) This forms a pellicle on the surface of the fluid, which has been compared to the cake of fat that forms on the surface of cold broth, but it is more comparable to the pellicle of carbonate of lime that forms on the surface of lime water after standing two or three days.

The experiments of Dr. Elisha K. Kane, while resident physician at the Philadelphia Hospital, and subsequently the distinguished Arctic explorer, are more extensive, and the results more satisfactory, than those published by any other American investigator. His inquiries, given in the *American Journal of the Medical Sciences*, of July, 1842, show that the *kyesteine pellicle* is observed in two or three days upon the urine, when exposed to the sun and air in a glass tumbler. It is apparent at the first month of pregnancy, and is considered valuable as a diagnostic sign. He, however, states that the pellicle appears at variable periods; he has seen it sometimes at the end of thirty-six hours, at others as late as the eighth day. In ninety-four specimens of urine from pregnant women, twenty out of twenty-one furnished kyesteine. According to Dr. Golding Bird, the pellicle, when thick, gives off a strong cheesy odor. Dr. Kane has verified this observation only in seven cases out of twenty-five, and has remarked no relation between the thickness of the pellicle and the strength of the odor.

A pellicle occasionally rises on the urine of healthy non-gravid females, but it differs in its characteristics from that of kyesteine. In cases of disease, a pellicle more frequently forms, but is distinguished from that of kyesteine by the time of its appearance. It seldom shows itself before the fifth or sixth day, and then is due to incipient putrefaction, which begins about that time. When the pellicle once commences, its formation is generally completed in two or three hours, whereas the kyesteine pellicle is two or three days in completing its formation, and appears to be entirely independent of the putrefaction process.

Chemically, the kyesteine differs from all the mucous and albu-

minous matters found in the urine. According to M. Eguisier, its properties are nearly all negative in their character, compared to those of the latter substances; thus it is not soluble in alcohol, ether, water, nor ammonia, and, unlike albumen, it is not soluble in alkaline fluids, nor, like mucus, in a mixture of soap and ammonia, neither in boiling alcohol and ether-like fat. Further, the urine containing it will not coagulate by heat as albuminous urine does, but deposits a copious white powder on cooling; nor will it coagulate by the addition of acetic acid.

Kyesteine has, however, many of the properties of these substances; it is precipitated by the deuto-chloride of mercury, by most strong acids, and the astringent solutions. With our present knowledge of it we must consider it as a new body, the nature of which is described by Bonastre and Nauché as being gelatino-albuminous.

Those who have made kyesteine the subject of special investigation agree very nearly in regard to its physical and chemical properties, while they differ widely as to their microscopical results. But there is enough known of it to establish its presence or absence in the urine.

To what is the kyesteine in the urine of pregnant females due? is a question that remains undecided. M. Eguisier, after endeavoring to prove that it is not attributable to any modification of the functions of the kidneys, respiratory or digestive apparatus, or the mammary glands, concludes that it must be owing to the passage of the amniotic liquor, or a part of its elements, into the urine.

Dr. Kane, on the contrary, maintains that the kyestine is intimately associated with the lacteal secretions. He says: "I have frequently proved the presence of kyesteine in the urine at different periods of lactation; for in forty-four suckling women out of ninety-four the perfect pellicle was developed, with all the characters it exhibits during gestation; and it was nearly always in those cases where the flow of milk is limited, or rendered difficult by some peculiar circumstance, and in which the breasts were consequently more or less engorged, that the kyesteine appears in the uterine, but it was found more rarely whenever the mother nursed her infant, and her breasts were properly drawn. In a word, the existence of kyesteine during pregnancy, and even after the

accouchement, up to the establishment of the mammary secretion, its rare existence pending lactation, and its reappearance, when the latter is suspended or impeded, at the time of weaning, for instance, establish an intimate relation between the functions of the mammae and the kyesteinic urine." Dr. Colding Bird adopts nearly a similar view.

Hence, from the observations of writers, it would seem that the period at which this principle appears in the urine of pregnant women, is exceedingly variable. The characters pointed out, remarks M. Equisier, habitually appear in the course of the second month, and acquire their greatest development from the third to the sixth; from the seventh month they seem to diminish continually in intensity until term, so that in the course of the ninth, and even at times in the eighth month, they are scarcely more marked than at the second.

M. Fanchou has observed it in women who have failed but once in their menstruation. In one instance, Dr. Kane detected it before the fourth, and in another prior to the fifth week, and frequently before the end of the third month (Cazeaux).

In ninety-four observations made by Dr. Kane, he failed to find the kyesteine in five instances, showing, therefore, it is not an *infallible sign of pregnancy*, but perhaps more uniformly present than any of the other *physiological signs*.

If the presence of kyesteine is so intimately connected with the functions of the mammary glands, may it not be present in the urine of non-gravid females during the sympathetic affections of these organs previously to each menstrual epoch?

This question is suggested by the result of a recent observation made by myself, of the urine of an unmarried female, who was laboring under a suppression of the menses of three months standing. From the accompanying symptoms, as occasional nausea and vomiting, desires and antipathies for certain articles of food, etc., and, above all, the excessive enlargement, the pain and soreness of the mammae, and the discoloration of the areola, I was led unwillingly to suspect pregnancy; hence the experiment on the urine. A portion was placed in a glass vessel, in a favorable situation, with reference to air and light, and allowed to stand forty-eight hours; at the expiration of that time the surface was

covered by a complete pellicle of kyesteine, which would have been taken as conclusive evidence of gestation had not the catamenia, pending the experiment, made its appearance. She had been placed under the use of ferri. carb. in doses of grs. x. ter. die. a fortnight previously, which with two very full meals of hot pepper-pot, a coveted dish, no doubt accelerated the happy event.

The suppression resulted from fright and grief, occasioned by the sudden death of a very dear aunt, which occurred in her presence, during a menstrual period, and caused a sudden suppression.

6. *The Features and Countenance.* A paragraph from Velpeau, gives as concise, yet graphic a description of the appearance of the features and countenance of some pregnant women as can be given. While these changes in the appearance of the face, in some women, amount almost to an erasure of their primitive good looks, for the time, others are quite reversely affected, and never appear to better advantage than during the early and middle months of pregnancy. In the first class, "the *eyes* lose their vivacity, their brilliancy, have an expression of languor, and seem to sink in their orbits, the eye-lids grow dark, and are surrounded with a blackish, livid or leaden circle; the *nose* grows longer and sharper; the *mouth* widens by the separation of its corners; all the features of the face seem to retire backwards, which renders the *chin* more prominent; the *face* becomes pale, is covered with spots of various sizes and numbers, sometimes reddish, or of a more or less deep brown; sometimes, but more rarely, of a dead or milk white color; in a word it becomes marked. The copper-colored blotches that often appear on the face and forehead of pregnant women, known as *morpheu* or *ephelides*, are supposed to result from deranged secretions of the *liver*. They are more common in the country, than in large cities. The action of the sun and air upon the skin, in its peculiar condition, has perhaps as much to do in producing the result as the liver. The secretions of the skin are more or less altered; women who perspire freely have now a dry, rough skin; whereas those who at other times have seldom or never a moist skin, have copious perspiration, which is not unfrequently of a peculiar strong odor. Cutaneous affections, also, which have been very obstinate, or had even become habitual,

sometimes disappear, or at least are suspended during the period of utero-gestation." It is quite probable that these ephelides are connected in some way with the modifications of the functions of the skin.

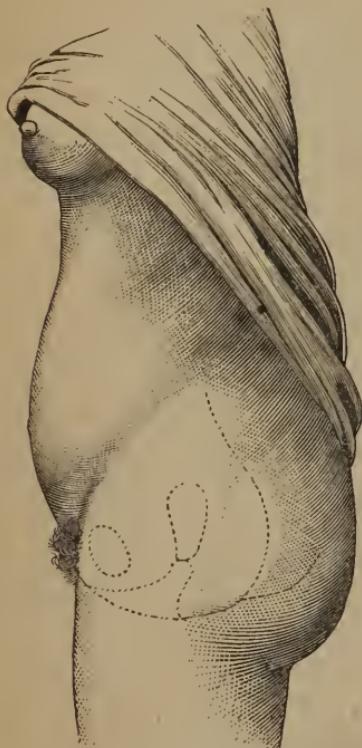
7. *Abdominal Enlargement.* From the fact of the abdomen being uniformly enlarged, by the expansion of the gravid uterus within its walls, this might be supposed to be the most certain, while really it is one of the most equivocal of signs. There are so many pathological conditions producing the same result, that the mere enlargement of the abdomen alone, is altogether valueless as a diagnostic sign of pregnancy. But when it occurs, in a proper manner, at a proper time, in the absence of any abnormal symptoms, and co-existent with other signs of gestation, it becomes an important co-ordinate means of diagnosing the true condition of the patient; for with all the other physiological signs present, and this one absent, at the proper time, the diagnosis would be unequivocally, no pregnancy.

Hydrometra, (*υδωρ*, *udor*, water and *μητρα*, *metra*, the womb) dropsy of the womb. Ascites (from *ασκος*, *askos*, a bottle) is properly dropsy of the peritoneum. Ovarium dropsy—Physometra from *ψυσαρ*, *physat*, I inflate and *μητρα*, *metra*, the womb) Uterine Tympanites, General Abdominal Tympanites, the uterus or abdomen, inflated with gas, fibrous tumors of the uterus or ovaries, other abdominal tumors, etc., all produce abdominal enlargement, and when connected with some of the other signs of pregnancy, as suppression of the menses, enlargement of the mamma, discoloration of the areola, etc., etc., which is by no means uncommon, may lead to serious errors in diagnosis. This sign therefore should be regarded as a very uncertain one, especially when accompanied with symptoms of constitutional, or local morbid disturbances.

It has already been stated that the first effect of pregnancy upon the volume of the abdomen, is to diminish it by producing an unusual flatness and at the same time depressing the umbilicus. This condition is maintained (except sometimes, when the size is somewhat augmented by the presence of gas in the bowels,) until towards the last of the third month, at which time from its increased size, the uterus raises up above the brim of the pelvis, when nearly the ordinary appearance of the abdomen and umbilicus is again

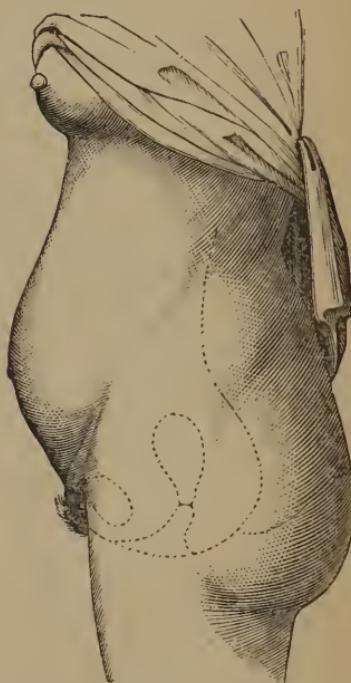
restored—that is the appearance before conception takes place. (See Figs. 68 and 69.)

FIG. 68.



APPEARANCE OF THE ABDOMEN IN THE
NON GRAVID STATE.

FIG. 69.



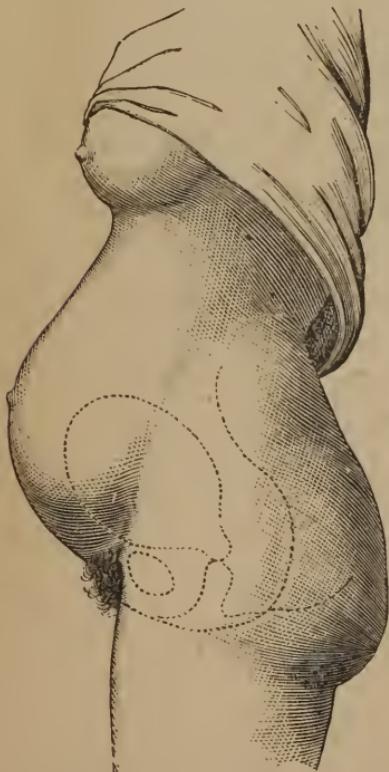
APPEARANCE OF THE ABDOMEN AT THE END
OF THREE MONTHS.

About the beginning of the fourth month the abdomen commences to enlarge above the pubes, the linea alba, dividing the uterine tumor in its centre. The increase in the size of the lower belly, is now perceptible, when undressed, and it goes on increasing in size, until near the close of the ninth calendar month, when there takes place a perceptible subsidence of the abdominal protuberance. The peculiarity of the shape of the abdominal prominence should be taken into account in deciding with reference to its character. From the first appearance of it, until term, the greatest projection is directly forwards which gives to the sides, a flatness, not observed, when it is produced by a tumor, or other abnormal production. In compound pregnancies there is also a greater breadth of the abdomen than in single ones. A great

difference in the prominence of the abdomen is observed in different women in this stage of pregnancy, which is due the difference of shape, height, and anatomical formation of the trunk, etc. Some are so formed that with a little tact and management, they can conceal their condition, when concealment is desired, until the close of the term; while others are so constituted that their situation, despite their utmost ingenuity and care, to hide it, will be divulged at a very early period. A broad pelvis and obtuse sacro-vertebral angle favor the former, while a narrow pelvis and more acute angle at the sacro-vertebral junction, cause the uterus to rise earlier out of the pelvis, and to project it continually forward.

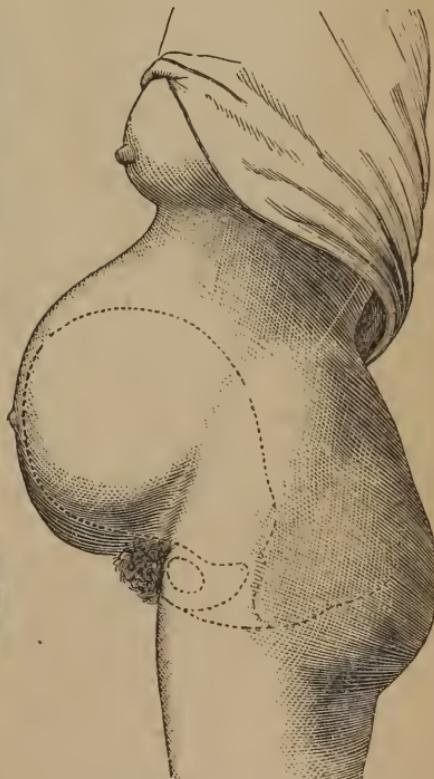
Figs. 68, 69, 70, 71, are introduced to show the relative size of the abdomen and the positions of the uterus in the unimpregnated state, and at the third, sixth and ninth months of pregnancy, and

FIG. 70.



APPEARANCE OF THE ABDOMEN AT SIX MONTHS.

FIG. 71.



APPEARANCE OF THE ABDOMEN AT NINE MONTHS.

also the difference in the appearance of the umbilicus at these periods.

The relative position of the uterus and the different parts of the abdomen during the various stages of pregnancy, were fully considered while studying the modifications of the positions of the uterus during gestation. Therefore nothing further remains to be said at present upon this point, and we proceed to examine further the modifications of the umbilicus.

Umbilical Changes.—It has already been stated, that the first perceptible change that takes place in the umbilicus after conception, is a perceptible depression of the part; the entire navel seems to sink into the substance of the abdominal walls, leaving upon the surface a well defined circle. The bottom of the part is found much deeper than usual, and directed backwards and downwards. It remains depressed, becoming more and more so, until about the fore part of the fourth month, or earlier, which depends upon the dimensions of the pelvic cavity. When the uterus begins to ascend out of the pelvis, which is sooner or later, as the pelvis is small or large, the umbilicus, being relieved by the relaxation of the tense urachus, begins to resume its natural position, which it fully attains when the uterus becomes entirely disengaged from the cavity and rises above the brim. As the uterus increases in size, and comes to occupy more and more of the abdomen, it presses the umbilicus further and further out, so that it soon becomes more shallow than in its normal condition; this continues until the last of the fourth month, or the commencement of the fifth, when it will be found on a level with the surface of the abdomen; at the sixth month it protrudes beyond the surrounding surface. It continues to get larger and more prominent during the remainder of the term. The umbilical ring becomes quite large towards the seventh or eighth month, and sometimes allows the peritoneum, or that portion of it called by anatomists the epiploon, and a portion of the intestines to escape through it, causing umbilical hernia. This accident seldom occurs before delivery, but may very readily happen soon after.

As these changes in the umbilicus always accompany pregnancy, they may be considered among the most reliable of the physiological signs. Though, like all the other signs of this class, they may

be present to some extent, under other circumstances, than pregnancy; large tumors, filling up the abdomen, a large quantity of water in dropsy, etc., may press the part outward, and cause a similar protrusion; but the history of the case, and the attending symptoms, will throw sufficient light to guarantee a correct diagnosis.

It will be observed that a flatness of the abdomen and depression of the umbilicus, both caused by a descent of the uterus, are co-existent. And the enlargement of the abdomen and protrusion of the umbilicus, caused by the ascent of the uterus, are equally co-existent. That the former are amongst the earliest, and the latter the latest, of the physiological signs of pregnancy.

There are several other physiological and even pathological conditions, that are sometimes classed amongst the signs of pregnancy, as the *pulse*, *rigors*, incontinence of urine, constipation, diarrhoea, etc., etc.; but they are of such little value that the time spent in considering them would be lost, and the space allotted to them wasted.

Some knavish practitioners assume a great deal of wisdom, and impose upon the ignorance of the public in regard to these matters, by avowing they can decide upon the existence of pregnancy, by the condition of the pulse alone; others by merely looking at the urine, etc. This is a species of quackery that is often practiced by those who are exceedingly flippant in the use of the term quack, and would take great umbrage at having their favorite epithet applied to themselves. But they are nevertheless quacks, and not unfrequently diplomated quacks, who assume more knowledge than they really possess, and in this way impose upon the credulity of the public. If that is not quackery there is no meaning in the term.

2. *Physical Signs of Pregnancy.* The second class of signs indicating the existence of pregnancy, are those that we have denominated the physical signs, and consist of all the appreciable phenomena pertaining to the foetus, as its active and passive movements, the results of auscultation, etc. They are uniformly more reliable than the preceding class, because they cannot exist without the presence of the cause producing them, which is the foetus. And when once recognized they can be referred to no other cause.

These will also be presented, as nearly as possible, in the order of their occurrence.

1. *Quickening.* The term quickening has been applied to the active movements of the foetus in utero. They are first manifested by a very slight quivering motion, and are generally perceived, by the woman, about the fourth month of pregnancy. In some, however, they are said to occur earlier, at three months and a half and even as early as three months. The movements may possibly be experienced by some exceedingly sensitive women at this early period, but we are free to say that such an occurrence is not credited. The time of quickening is often deferred to a later stage, as at five or even six months, while it is declared by some women that in some of their pregnancies they never experience the least sensation of the foetal movements, during the whole period of gestation. Very many women make their reckoning from the time of quickening, and estimate their term of pregnancy as half gone; in such instances the foetus quickens at four and a half months.

The quivering or crawling motion that is first felt by the woman gradually increases in strength, until finally it not only becomes plainly perceptible, but actually painful to the sufferer, and can be readily recognized by the second person, by placing the hand upon the abdomen. In the latter month of gestation, after the foetus has acquired a due degree of strength, its motions can be plainly seen, through the movements transmitted to the abdominal walls. The foetal motions are generally more frequent during the first two or three months of their existence, than subsequently. It often occurs that they are, comparatively, but seldom felt during the eighth and ninth months; but when they do take place they are much stronger than previously. Very often they are not experienced at all during labor, and sometimes not for several days before. This fact has frequently led to the suspicion that the foetus was dead, and might lead to disastrous consequences should the accoucheur attempt to act upon the presumption, and resort to craniotomy, or still more hazardous means, to effect delivery.

The means usually resorted to, to produce the foetal motions, when it is desirable to ascertain, by this means, that a foetus really exists in utero, is to place the cold hand suddenly upon the abdo-

men. For this purpose the hand should be dipped in very cold water, and allowed to remain there for a minute or two, and then applied; the foetus, if present, will immediately respond, by furnishing the desired movement.

Sometimes it is more agreeable to the woman to believe she is not pregnant, especially when such a state results from illicit intercourse, and though she may feel the first feeble movements of the foetus, and perceive their gradually increasing strength, she will nevertheless try to convince herself that the sensations are all imaginary, or attribute them to some other cause. Under such circumstances the inquiries of the accoucheur will be found to be of but little avail, and recourse must be had to the foregoing expedient, or some other means of exciting the movements.

Again, the imagination often plays in an opposite direction, and the guilty party fancies she feels the foetal motions, though no signs of pregnancy whatever be present, not even a suppression of the menses. Some time ago I was called upon to decide in a case of supposed pregnancy, by a woman whose husband had been from home for several months. She had received a letter, informing her he would be home in a few weeks. This intelligence, instead of bringing joy, filled her mind with great perturbation; she freely acknowledged her impropriety, and desired above all things to be satisfied in regard to her situation. She had not missed her courses a single time, had experienced no morning sickness, had no longing for nor loathing of food, no change in the mammae or areola, in fact there was not present one sign or symptom of pregnancy; but she insisted that she plainly felt the movements of the child, though she supposed herself to be but three months gone. I told her it was all imagination, that she was not pregnant, and advised her to go home, "and sin no more." She appeared to be satisfied and left. In a week from that time she presented herself again, with conscience "ill at ease," and was more positive than ever that she had felt the foetal motion several times since her last interview, and insisted on being examined; she was under the impression that the knowledge thus obtained would be conclusive, and would relieve her mind of all further anxiety and doubt. With a view of satisfying her I complied with her request, and then renewed my assurances that she was as free from pregnancy as a

babe. Receiving this as a finality, she left, and I have heard nothing from her since.

When we aver that the foetal movements constitute a certain and infallible sign of pregnancy, we do not claim to be responsible for every little quirk of malcontent muscular fibres, that may set the structures in irregular motion, nor the erratic movement of the gas within the intestines, nor the freaks of the imagination that may conjure up movements out of nothing, and haunt the mind with the fancied existence of a foetus in utero, when there is not present a single evidence of the fact. These may answer a good purpose to punish naughty girls and incontinent women, but they are of no account as diagnostic signs of pregnancy, and should not be allowed to detract from the importance of the real foetal movements, by complicating them and impairing their value.

Authors divide the foetal movements into two classes: 1. Those produced by a part or the whole of the trunk. 2. Those produced by the extremities. The first are distinguished by a more general quivering motion recognized by the woman. This is where the movement is enjoyed by the whole trunk, while large tuberosities or elevations are observed to destroy the evenness of the abdominal surface, where parts of it only are in motion. The second variety is characterized by short, sharp, irregular strokes, producing corresponding shocks or concussions, that are often of strength sufficient to induce severe pain, of which the woman complains, and which sometimes cause her to start suddenly, which is very mortifying when in the presence of strangers.

Very different views from the foregoing are held by many distinguished accoucheurs, in regard to these abdominal movements at the present day.

Dr. Tyler Smith holds, that most of the abdominal movements during pregnancy, that are almost universally believed to be foetal, are due to the peristaltic and other actions of the uterus itself. It is his opinion, that the prevalent belief in this test of the life of the foetus is often fraught with mischief and danger to the mother; that seldom a difficult case of labor occurs, where these signs do not influence the accoucheur. He mentions a case where every preparation was being made to perform the Cæsarian operation, pending which the patient was delivered of a putrid child, which

had been dead for some time, though the movements were present and influenced such action. In another case, a young woman was accused of illicit pregnancy; this sign and others concurring led her to believe herself enciente, and her shame and disgrace hastened her death. An autopsy proved no pregnancy had ever existed. He says he could put his finger on many recent, similar cases, to prove that a reliance on this sign has led to most serious mischances in practice.

He observes that: "If the abdominal movements in the latter months of pregnancy are carefully observed, two tolerably distinct kinds of motion may be made out. The one is a movement traversing irregularly over the abdomen, and conveying the sense of hardness, either in ridges or in eminences underneath the hand. These movements are often felt at several points of the uterus simultaneously, and are accompanied by pain. When the hardness is most apparent the patient will say that the child kicks and hurts her. These movements will, in some cases, continue for hours together, particularly at night. When very violent they give the idea of a blow or a succession of blows, if the hand be laid upon the abdomen. The other kind of movement is distinct from that I have been describing; it conveys to the hand a sudden shock or impulse, like that obtained by percussion in ascites, only stronger. The abdomen gives, as it were, a sudden shudder; it is like the quick and temporary movement of a young infant touched in its sleep. The first and most frequent of these movements, I believe to be purely uterine; the second, foetal, and to be felt only in undoubted pregnancy."

Our author here goes on to give his reasons at length for his belief; many of them are clear and convincing, and his conclusions irresistible. No unbiased reader can peruse and study his very ingeniously constructed article on this subject, without having his faith in the dominant teachings of the schools considerably shaken.

The student is referred to his most excellent work on parturition, from page 107—117, for what he has to say in defence of the propositions above quoted.

SECTION II.—PASSIVE MOVEMENTS OF THE FœTUS.

The Touch. In the term touch, obstetrically considered, are embraced all the different modes in which the finger or hand of the accoucheur can be employed either internally or externally to ascertain the condition of the uterus and its adjacent parts, in regard to pregnancy, or their abnormal state or position. And it is brought into requisition in all cases when the sense of feeling is relied upon as the means of acquiring the knowledge desired, in reference to the organs and functions of reproduction. It is therefore resorted to internally as a means of ascertaining the condition of the vulva, in regard to its relaxation or rigidity, upon the approach of labor; of the vagina, with reference to its pliability, or state of resistance, and to the presence of tumors or other impediments to the passage of the child, in either the bony or soft structures of the pelvis. Of the os and cervix uteri in relation to the existence and stage of pregnancy; the approach, stage and advancement of labor, the state of the os uteri relative to its relaxa-

FIG. 72.

tion or rigidity, the condition of the presenting ovum, position of the fœtus, the force, frequency and efficiency of the uterine contractions, etc. And after delivery, to secure the timely escape of the placenta, and the proper contraction of the uterus.

Ballottement, a French word, signifying *agitation*, *movement*, etc., and in this sense means “the motion impressed on the fœtus in utero, by alternately pressing the uterus by means of the index finger of the hand introduced into the vagina, the other hand being placed upon the abdomen,” constituting what are called the passive movements of the fœtus; and is effected by one of the modes of touching.

Fig. 72 represents the position of the hand for touching. The index finger is extended; the remaining three are closed in the palm of the hand, and the thumb is overlapping them.



For the sake of convenience the accoucheur should practice touching with both hands, as he may be sometimes placed in an awkward predicament, without such experience, when circumstances preclude the use of one in particular, which is not unfrequently the case from the arrangements of the room, the position of the bed, etc.

The young practitioner, whose mind has been properly trained in regard to morality and delicacy towards the sex, experiences no little embarrassment, when first entering upon the duties of this branch of his profession ; and it requires the exercise of a great deal of tact and self-possession to keep him from betraying it. While all sensible women with properly regulated minds, willingly submit to this requirement, as a necessity, they, nevertheless, are not unobservant of the conduct and movements of the medical attendant. If he should betray embarrassment and too great backwardness it might beget mistrust and want of confidence ; on the other hand if he should manifest too great eagerness to act, or undue forwardness, it would create disgust—in either case he would be apt to receive a polite intimation that his further services were not required.

If he should be convinced that the good of his patient would be enhanced, by submitting to the touch, he should in a natural and becoming manner state his convictions, and speak of the process in a plain familiar manner, he should not be too ceremonious, nor too free in his remarks. He should be firm in adhering to the necessity of the measure, but not too urgent in his requirement. A sensitive delicate female would receive a peremptory demand from a physician of more age and experience, better than she would a moderately earnest request from one who is just commencing his professional career. Let wisdom, prudence, moderation and firmness direct his course, and it will generally find a favorable response even from the most fastidious.

Having obtained the consent of his patient, after due deliberation, which it may require several interviews to secure, if the case be not very urgent, he should proceed with the strictest regard to delicacy, and avoid the least exposure possible. The touch may be performed either in the erect or recumbent posture.

Preparatory to its performance, the woman should be placed in the most favorable posture. The feet should be placed far enough apart to allow of sufficient room for the hand of the accoucheur between the thighs, this should be permitted as much freedom as possible, as restraint in its movements interferes with the performance. A chair should be placed on each side of the patient for her to rest her hands upon, and she should incline the body slightly forwards so as to relax the abdominal muscles, and bring the foetal head in a more favorable position for touching.

Having made these few necessary preparations, the accoucher places himself in front of the patient, and kneeling upon one knee, proceeds to introduce, under cover, one hand to the vulva and the other to the abdomen. The woman should be loosely dressed, so as to admit of no restraint to the hand upon the abdomen. The hand destined for the vulva should be passed up, and with the fingers all flexed, let the dorsal aspect be pressed, with tolerable firmness, against the perineum; then draw it slowly forwards with the index finger, more strongly pressing upwards, when, as it passes over the genital fissure, it will engage between the labia and enter the fissure. Its introduction to the vagina will be much facilitated by having it well lubricated with lard, pomatum, or some other lubricant of proper consistency; this will also serve as a protection to the accoucheur against any disease the patient may have contracted. After the index finger is well introduced into the vagina, the thumb should be made to rest upon the lower margin of the mons veneris, with the pubes resting between the thumb and knuckle-joint of the index finger, with its radial border pressing against the symphysis pubes, the three closed fingers resting against the perineum. With the hand thus placed, it is to be pushed upwards as firmly as the patient can bear without pain, to enable the end of the finger to come in contact with the os uteri, or to press, through the vaginal walls, against the most pendent part of the uterus, rendered such by the presence of the head of the foetus. If it be found that the index finger is too short to reach the desired point, the next one, which is considerably longer, may be extended. By this means, the breadth of the second finger is removed from the perineal border of the vulva, where it acted as an impediment to the further advance of the hand upwards;

thus is gained the additional length of the second finger, besides the breadth of it, by enabling the hand to be pressed that much further up. The second hand is placed upon the abdomen, over the fundus uteri, and plainly feels the pressure of the foetus against it, when it is elevated by the finger or fingers in the vagina. These, in turn, perceive the pressure when it is depressed by the hand upon the abdomen. Thus, by the alternate action of the two hands, the process of ballottement may be continued until perfect satisfaction is obtained in reference to the condition of the patient, whether pregnant or not. The foetus floats in the liquor amnii like a ball or cork in a vessel of water, and is easily moved by a slight force applied. If there is no pregnancy, there cannot be any ballottement. Ballottement cannot be accomplished before the fourth month of gestation, because previously to this the uterus is contained within the pelvis, and, moreover, the head and other structures of the foetus are not sufficiently firm to convey the impression from one hand to the other. It is held to be of but little value after the sixth month, as there are then other and sufficient means of diagnosis present. There is another mode of performing ballottement, practiced by some accoucheurs, but it is less satisfactory than the foregoing; it consists in raising or tossing the foetus as high up as possible in the uterus, with the finger in the vagina, then wait and allow it to drop against the finger that tossed it. This process is repeated *ad libitum* until full satisfaction is obtained.

This is regarded the most unequivocal sign of pregnancy, but it is possible that it may fail, as a pediculated tumor or mass of hydatids might be mistaken for a foetus, and this give rise to an error in diagnosis. For touching, with any other view, than ballottement, the recumbent posture is preferable; for some diseases, deformities, morbid growths, displacements, etc., other positions than lying or standing have been chosen, as the stooping, squatting, or upon the hands and knees, etc. Sometimes, some advantage is derived from these ungraceful postures, but for all ordinary purposes the lying is preferable. Some practitioners prefer the patient lying on the back, while others choose the side. For various reasons, both as regards the patient and accoucheur, the latter has the most decided preference. If the right hand be designed for the use, the

patient should be placed upon the left side, diagonally across the bed, with the hips as near the edge as possible, so as to be within easy reach by the hand; the body should incline forward, the thighs be flexed upon the trunk, and the legs upon the thighs; in a word, she should be placed in what is known as the obstetrical position; during which the vulvæ will be found posterior to the flexed thighs, which, by being thus drawn up, will be wholly out of the way of the hand, and will not interfere in the least with the operation, which is not the case in either the erect or back position. It is not necessary that her clothing should be removed, but when placed in position, a sheet, spread, or light quilt should be thrown over her, as a protection against exposure. After the patient shall have been properly arranged, the accoucheur will take a seat at the side of the bed, with his right hand near the hips, and, having lubricated it, or the finger to be used, especially, he will proceed, as directed before, by placing the dorsal surface of the closed fingers against the perineum, and drawing the hand slowly forwards, with the index finger pressing more firmly than the others against the parts, the posterior commissure, and the parallel bodies of the labia will soon be encountered, and the finger will enter the fissure; the further disposition of the hand will be made according to the directions given for the erect posture and ballottement. The foregoing directions are applicable to all cases of touching, whether for ballottement, or any other purpose, where vaginal or *rectal* explorations or examinations are indicated. Ballottement, in the recumbent posture, must be performed by the alternate motions of the hands, as in the erect. It cannot be accomplished so perfectly as in the latter position; but from the existence of spinal or other diseases, or from other causes, it may become necessary sometimes to employ the former.

Ballottement, when perfectly performed, it has been said, furnishes the most conclusive evidence of pregnancy; but it is by no means easy of accomplishment by the inexperienced practitioner, and many failures may be encountered before any very favorable results will attend his efforts. To become an expert in this manœuvre requires a good deal of practice on the living subject. The movable condition of an anteverted or retroverted uterus, may lead to erroneous conclusions with the inexperienced.

2. *Abdominal palpation.* (From *palpatio*, to feel.) Palpation is the act of feeling, and abdominal palpation is feeling the abdomen. Information derived from this source, is often of great value in making a diagnosis of pregnancy. And a knowledge how to perform palpation, and of what is to gain by it, is the first to be acquired in relation to it. It can best be performed in the recumbent posture, and the woman should be so placed, as to secure a complete relaxation of the abdominal muscles; any degree of tension in these might defeat the end in view. While this can be most completely effected by having her take the obstetrical position, it is not the most convenient to the accoucheur, because it interferes with the free use of both hands, which is required to effect it properly. A sufficient relaxation of these muscles can be obtained by placing her upon the back, near the side of the bed, with the hips and shoulders elevated, at the same time requesting her to exercise her volition as much as possible, to prevent their contraction. By the assistance of the vaginal touch, where the woman is not too fleshy, and the abdominal walls not very thick, the hard substance of the unimpregnated uterus may be felt above the pubis; by pressing one hand firmly upon the abdomen immediately above the pelvis, and with the index finger of the other pressing the organ upwards; during its elevation the fundus can be very readily perceived by the hand externally applied. And then by pressing upon the fundus, the finger upon the os will in turn receive the impression from the external hand. Thus by the alternate motions of the two hands, one operating on the os and the other upon the fundus, the elevation and depression of the uterus may be continued until full satisfaction be obtained, that the mobility thus induced is real, and not merely imaginary. While the hands are thus employed, it is not difficult to judge of the distance the points of the hands holding organ are apart, which will be its length. If this manœuvre can be performed in the non-gravid state, it can be more easily accomplished during any period of the first four months of pregnancy, before the uterus has escaped from the cavity of the pelvis. If palpation be resorted to, at the first, second and third, and even the fourth months, the hand upon the abdomen will receive the influence of the pressure upon the os, more and more distinctly each month, and a greater distance will be perceived

between the finger upon the os and the hand upon the fundus, externally, at each month, and the external hand will recognize a marked increase in the volume of the convex surface of the fundus at each succeeding observation. The gradual increase in the length and volume of the uterus, in connection with the corroborating signs incident to this period, adds important testimony to that already observed in favor of pregnancy.

After four months, and the os uteri has retired high up in the pelvis, and the fundus and body have escaped above the brim, by palpating the hypogastric region with the ends of the extended fingers of both hands pressing sufficiently hard, the firm, round substance of the uterus can be readily traced, and by gradually moving the finger-ends up towards the umbilicus from the pubis, they will be found to glide over the convex surface of the fundus, and sink deeper into the abdominal structures than they were able to do with the hard, uterine substance beneath them. The ends of the fingers can also trace the lateral borders of the fundus and the upper portion of the body. By this effort the accoucheur discovers that the uterus has left the cavity of the pelvis, and is now occupying the hypogastric region. This fact, in view of the time since the last menstruation, not only confirms the suspicion of pregnancy, but also fixes the stage to which it has advanced.

It is by palpation that the different parts of the abdomen, at which the fundus uteri can be felt, at the various stages of pregnancy, are determined. By referring to the article on the modification of the position of the uterus during pregnancy, the student will refresh his memory in relation thereto. Palpation made in reference to these positions, is not only a valuable means of determining pregnancy, but also of judging of the probable time of the approaching parturition.

Palpation cannot be resorted to with any degree of certainty, where the ventral parieties are very thick, nor where they are rigid and unyielding. Where there is undue sensitiveness in the uterus or adjacent structures, it cannot be borne; but in this case, it can be repeated after the soreness shall have been removed. In most instances, however, there is nothing to interfere, and it can be performed with very satisfactory results.

3. *Percussion.* By this means the character of the abdominal

tumor may be ascertained, which, when taken in connection with its shape and history, afford a valuable means of diagnosis. If, upon percussion, it be found to be fluctuating, and its lateral diameter corresponds with the antero-posterior, or, in other words, if it be broad in proportion to its anterior projection, it will be regarded as abdominal dropsy. If the abdomen be broad and prominent, non-fluctuating and resonant, the case will be determined one of abdominal tympanites.

If the tumor be most prominent anteriorly, is neither fluctuating nor resonant, but is comparatively solid, with a certain degree of elasticity and mobility, under a relaxation of the abdominal muscles, and maintaining its oval shape, and previously to the fifth month, it be either in the middle, or a little to the right or left side of the abdomen, it may be regarded as a case of pregnancy.

4. *Auscultation*.—(*Auscultatio*) from *auscultare* “to listen;” the act of listening, and is performed by means of the stethoscope, or by applying the ear directly to the part to be examined. The stethoscope is an instrument invented by Professor Lænnec, of Paris, for examining the chest, in diseases of the thoracic viscera, and was for some time greatly in vogue, but which, to a great extent has been superseded by the bare ear, except in some cases of females, where the mammae prevent the direct application of the ear to the walls of the chest; and in cases of young bashful girls, it is often used from motives of delicacy; and where auscultation of the lower abdomen is objected to, on this ground, perhaps the stethoscope had better be employed. Aside from such considerations, it possesses no merit, that is not enjoyed by the unassisted ear.

Auscultation has, within the last half century, been extensively employed as a means of diagnostinating pregnancy. M. Mayer, of Geneva, was first to observe the interesting fact that he could hear the pulsations of the foetal heart through the parietes of the mother's abdomen and uterus; he published his discovery in 1818, but made no further researches; and the matter did not attract much attention, until Lejumeau de Kergaradec published his famous essay, read before the Academie Royale de Médecine of Paris, in 1823. He announced that if the abdomen of a woman who had passed the first half of her pregnancy be carefully auscultated, two sounds, perfectly distinct in character, will be recognized. One of

them consists of single pulsations, synchronous with those of the mother's heart, accompanied with a deep whizzing, rushing sound, which may be heard over a large portion of the uterus at once; this, Kergaradec supposed, was produced by the circulation of the blood in the spongy structures of the placenta, and called it the *soufflet placentaire*. The second sound he described as sharp, distinct, double pulsations, producing a ticking sound, similar to that of a watch under a pillow or wrapped in a cloth, and followed by a rythm, which is not synchronous with the maternal circulation. This sound is produced by the pulsations of the foetal heart, and is called by the French *bruit du cœur*. The first sound as described by Kergaradec, has received several titles, each derived from its supposed origin. M. Bouillard and others have referred its seat to the large arteries of the abdomen and called it the *abdominal soufflet*. M. Paul Dubois, has undertaken to prove that it is due to the circulation in the large vessels of the uterus, and termed it the *uterine soufflet*. These three opinions embrace about all that is known in regard to this sound. It is averred, however, that where a tumor of any kind lies over one or more of the large arteries and presses upon them, the *bruit de soufflet* or murmuring sound is produced; from this it is inferred that the uterine tumor pressing upon the internal iliacs gives rise to the sound in pregnancy; on the other hand, it is said, that it may be perceived in the placenta, after its delivery. Cazeaux, after devoting three or four pages to the discussion of these different opinions, arrives at but one definite conclusion in regard to the subject, and that is, that it is of but little practical value as a diagnostic sign of pregnancy. Viewing it in the same light, we cannot perceive any advantage, in either a scientific or practical sense, in pursuing it farther, and therefore dismiss it for the present.

The *bruit du cœur* or sound of the foetal heart, however, presents quite a different aspect; when it can be heard it is not only an indubitable sign of pregnancy, but also an index, of some value to the presentation of the foetus. The time most favorable for auscultating, for the sound of the foetal heart, is about the beginning of the sixth month, though it is averred to have been heard at a somewhat earlier period. Dr. Evory Kennedy has in a few cases detected this sound even before the expiration of the fourth month, yet in a majority of cases it will not be perceived until

later. Sometimes there is some difficulty attending the search for the sound, as it appears that it is not uniformly the same, in the same place, even at the most favorable times. It frequently occurs that it will be heard distinctly for a short time then die away, and remain silent for some moments, and again become audible in the same place or at another point of the uterus. Care and patience are therefore required in auscultating for it, lest the effort end in disappointment. The point of the abdomen, at which the sound is most likely to be heard is about midway between the scrobiculus cordis and symphysis pubis, a little to one side, and that generally to the left. When heard they will be found beating from 130 to 150 double strokes per minute. The age of the foetus, nor any condition of the mother appear to have any influence upon the foetal circulation. When the mother's pulse is augmented in frequency by fever, or depressed by a chill, or otherwise, or where it is affected by any mental emotion, or other disturbing cause, the sound of the foetal heart manifests no change whatever; neither is it affected under the action of labor, but as this approaches, it continues with the same rapidity as when first detected.

When there is an undue quantity of liquor amnii, or a dropsical effusion in the abdomen, or where a portion of the intestinal mass intervenes between the uterus and the ventral parieties, or the abdominal walls are unusually thick, as in obesity, etc., the sounds are less distinct, requiring greater care to perceive them.

A proper position of the woman, during auscultation, for the sounds of the foetal heart, is indispensable to the success of the effort. It need not differ widely from that directed for palpation. The woman should be placed on the back with the knees drawn up, and the head and shoulders elevated, so as to secure a complete relaxation of the abdominal muscles. This preparation is more especially necessary when auscultation is about to be attempted, during the early months of pregnancy; towards the latter part of the term it may be done while standing. The anterior portion, and fundus of the uterus, in the earlier months can be examined more thoroughly while lying upon the back; if it should be desirable to explore the lateral borders of the organ, the position must be changed to one side or the other, as the case may be. In this position the thighs may remain flexed, or be extended as is

found most convenient. Towards the latter part of pregnancy, after the abdomen becomes prominent, auscultation is easily performed in almost any position ; of course such a one may be selected as will comport best with the comfort and feelings of the patient, and the convenience of the accoucheur.

It has already been hinted, that in view of accommodating the feelings of the patient, the stethoscope might be used in auscultating the abdomen ; its application, or that of the ear direct, if the latter be chosen, had better be made to the bare skin ; the covering, however, of a thin under-garment need not be objected to, as it will not interfere materially with the transmission of the sound. The instrument or ear should be applied to the spot where the sound may be supposed to be heard, which is a little to the left of the umbilicus ; that is if the auscultation be made during the sixth month. The foetal movements will serve as a good director to the point from whence the sound may be expected to emanate. If the motion be felt on the right side, the sound will be heard on the left, and *vice versa*. As the superior and inferior extremities, which produce the motions, are folded upon the anterior aspect of the foetal trunk, and lie to the right side of the mother's abdomen, the dorsal surface will be to the left, and this is known to give off the sounds of the pulsating heart more audibly than the anterior ; the auscultation should, therefore, be made on the opposite side to where the motion is felt.

While the *bruit du cœur* is not very satisfactorily heard before, about the beginning of the sixth month, the *abdominal or placental soufflet* may be detected at a much earlier period ; it is indeed the first sound which auscultation detects during pregnancy, and may be heard as early as the fifteenth or sixteenth week, and cases occasionally occur where it has been distinguished in the thirteenth or fourteenth week. Dr. Kennedy has given some very interesting examples where he was able to hear it with certainty at the twelfth, eleventh, and even in one instance at the tenth week. During these earlier periods, the sound is weaker, but extends over the whole uterus, from the diminutive size of which it can be heard most readily immediately above the symphysis pubis ; in fact there is every reason to suppose that the *uterine soufflet* might be detected at a still earlier period, if the uterus were at this time within reach

of the stethoscope. As pregnancy advances, it becomes more distinct and powerful, and is occasionally so to a remarkable degree. (Rigby.) This sound, where it is certain the woman is free from internal aneurism, or abdominal tumors, may be regarded as one of the diagnostic signs of pregnancy; but its great liability to complications materially impairs its value as such.

The Bruit du Cœur, is an index to the presentation of the foetus. Cazeaux regards the results derivable from this method of exploration to have certainly been exaggerated, but gives the following deductions as the result of his experience:

"1st. When the pulsations are heard low down on the left side and in front, the foetus is in the first position of the vertex." (That is, the posterior fontanel, to the left acetabulum); "if heard below, in front, and to the right, the foetus is in the second position," (the posterior fontanel to the right acetabulum); "but it is often very difficult, not to say impossible, to distinguish an occipito-anterior," (the posterior fontanel to the symphysis pubis) "from an occipito-posterior one" (the anterior fontanel to the sacrum) "by this method. In general, however, I have thought the pulsations were more sonorous and less apparent in the flanks, in the first case than in the second. 2d. A presentation of the breech may be suspected when the sounds are heard on a level or above the umbilicus, the point where they are most distinct, indicating the relation of the child's posterior plane; and our suspicions will almost amount to a certainty when the sign shall be further strengthened by those derived by the touch."

Another very nice question in diagnosis has been raised by the French, which, if applicable in practice, as it is ingenious in theory, would contribute much to the importance of abdominal auscultation in pregnancy. It is this: "Can we appreciate the state of the child's health or disease, of its debility or vigor, during labor, by means of auscultation?"

Could such changes in the pulsations of the foetal heart, as indicate feebleness of stamina, or a failing of the vital powers, during labor, be determined with certainty, such as a deterioration in the force or frequency of the pulsations, or an entire suspension during the uterine contractions, with a feeble reaction during the intervals, etc., the indications, to effect delivery as speedily as

possible, could not be misunderstood. On the contrary, could it be ascertained that the foetal heart had sustained no abatement in the force or frequency of its pulsations, but maintained its integrity, unchanged, during the uterine efforts to expel the foetus, the accoucheur could be satisfied that no necessity existed, so far as the child was concerned, for interfering with the natural process of labor.

M. Naegèle, Jr., has recently described a *bruit de soufflet*, which he attributes to the pulsations of the umbilical cord, and compares it with the sound produced by the beating of the carotids in chlorosis; and this *bruit* (sound) consists, he states, of a simple pulsation, which is not synchronous with the *bruit de soufflet* already mentioned. It is caused, as he thinks, by the winding of the cord around the neck of the foetus, or by its compression between the child's back and the uterine walls; the *bruit* (sound) increases after the escape of the liquor amnii, and its force is greater in proportion as the arteries of the cord are more developed, and are more twisted on each other. (Cazeaux.) This sound has often been heard, however, where there has been no indication of the least compression upon the cord, nor any winding around the neck. From this fact authors have not been satisfied whether to refer it to the heart or the umbilical cord, but ask for further observations on the subject.

M. Stoltz, Professor of Strasburg, has described a rustling, or rather a dull, irregular, murmuring sound, like that of fermentation, which is only observed after the death of the foetus, and is attributed by him, to the decomposition of the amniotic liquid.

If this sound is referable alone to the cause stated, it cannot always be present simultaneously with a dead foetus in utero, because the liquor amnii often resists decomposition for several days, sometimes for two weeks or longer, and in case of twins, where one is dead and the other remains alive, for two months and more, and is born apparently uninjured, the liquor amnii remains unaffected, though surrounding a partially decomposed foetus. This *bruit*, therefore, cannot be regarded as a diagnostic sign of the death of the foetus, of any value. It cannot be credited that a foetus could live and grow and come to maturity, while surrounded for weeks by a decomposed, putrid liquor amnii. The fact of a

fœtus living, growing and maturing in the uterus, with a dead and putrifying one, shows one of two things—1st. That the liquor amnii is not effected by the decomposing mass floating in it, or 2nd. That the living fœtus resists the action of the putrid liquor amnii. We are led to adopt the former hypothesis, from the fact that in single pregnancies, fœtuses have often been expelled partly decomposed, when the liquor ammii bore no evidences of change whatever.

Though auscultation may reveal all the varied sounds that are claimed for it, and observation assign them to particular parts of the gravid uterus and its contents, and invest them with due significance, yet a great deal of experience is required to train the ear to appreciate their delicate variations, and refer them to their appropriate origins, and deduce from them correct conclusions. And he who designs becoming an adept in this means of diagnosis, should not fail to embrace every opportunity presented, to perfect himself in the delicate and important art of listening.

Finally, auscultation has been successfully employed to determine the existence of twin pregnancies. To apply it with this view, the positions occupied by the two fœtuses in utero should be recalled to mind, that there may be no misapplied effort or disappointment in the attempt. It will be recollected that in twin pregnancies, one fœtus generally presents with the head and the other by the breech, with the dorsal surface of each looking to the sides of the mother's abdomen; the *bruit de cœur* of one fœtus low down on one side, and that of the other, high up on the other. Sometimes in single pregnancies the sound of the heart reverberates throughout the uterine tumor, so that it can be heard with equal distinctness at any part of the uterus, or at different parts at the same time; this has been taken for the sounds of two hearts, and led to an error in diagnosis. Such mistakes should be guarded against.

CHAPTER II.

THE PSYCHICAL SIGNS OF PREGNANCY.

IT seldom occurs that the mind remains uninfluenced, in some degree, during the period of gestation, thus evincing a modification in the functions of the great nervous centres, other than those sometimes manifested in the irregularities of the physical organism as spasmodic affections, palpitations, spasmodic cough, paroxysms of asthma, vomiting, fainting, cephalæ, odontalgia, etc.

Often amongst the signs of early pregnancy, are observed mental aberrations of greater or less intensity, varying from a simple deviation from the ordinary condition of mind, as a change, merely in the tastes and disposition, to extremes of far greater violence and gravity, as annoying hallucinations, and dangerous sympathetic mania. Some women, who otherwise are of a cheerful disposition, are now gloomy and reserved; others are never more happy, gay, or agreeable, than during pregnancy. In some the temper becomes fretful and impatient, while in others who are naturally hasty and irritable a more peaceful disposition prevails. "A gentleman, says Dr. Montgomery, "lately informed me that being afflicted with a stepmother naturally more disposed to practice the *fortiter in re*,^{*} than to adopt *soaviter in modo*,[†] he and all the household, had learned from experience, to hail with joyful anticipations the lady's pregnancy, as a period when clouds and storms were immediately changed for sunshine and quietness."[‡]

Velpeau says: "The moral condition of the female is also subject to pretty numerous changes: some women, naturally gay, good tempered, and amiable, become sad, melancholy, cross, unsociable, and *vice versa*. In a good many women, the passions, although previously moderate, acquire an extraordinary violence, cannot be subdued, and cause the commission of the most atrocious crimes; in others there is an irresistible tendency to steal objects

* Firm in acting. † Gentle in manner. ‡ Rigby's Midwifery, foot note, page 81.

of small value, or for which they have no use, and corruption of their manners or character. There are some whose wit is never more lively, more penetrating, more agreeable ; while others fall into a sort of stupidity and apathy quite unnatural to them. In general the activity of the intellectual faculties is augmented, whether in whole or in part. In one case the memory, or a taste for the arts and sciences, is modified ; in others the judgment becomes exquisite, or the imagination is exalted to such a degree, that some women have, during their pregnancy, attained to a surprising degree of perfection in those works of genius, those arts or sciences, which they had previously cultivated with indifference and without success ; some lose their senses and become crazy, always at the same period of their pregnancy ; others are seen in whom mania never disappears, and who never become composed except during this function."

A most estimable lady in this city, the mother of three lovely children, and who had miscarried twice, manifested symptoms of insanity, early in her sixth pregnancy, of a very destructive character, threatening to culminate in the destruction of her furniture, the lives of her children, and her own existence. In a state of semi-sanity, in which she could perceive the gradual encroachment of her malady, from day to day, upon her reason and powers of resistance, she would conceive the most atrocious crimes, and commence preparations for consummating them, when reason, with a powerful effort, would recall her wandering mind back again to the consciousness of her contemplated design. She would shudder at the thought of the awful deed she was about to commit, and dash from her the implement of destruction already in her hand. While, with a vigorous effort of the will, she could keep her thoughts and actions under control, she and hers were comparatively safe ; but the instant she would allow it to be diverted from the one object, viz. : guarding her thoughts and actions, she would again be aroused, by some accidental circumstance, from the contemplation of a crime equally if not more heinous than the first. This state of things she could observe were becoming more and more aggravated day by day, and her constant efforts to control herself becoming more and more exhausting to her mental energies, she was upon the very verge of despair, when the induction of abortion was

resorted to, which resulted in a speedy and complete dissipation of all the alarming and distressing symptoms. In neither of her five previous pregnancies had she ever experienced any such manifestations. But early in the seventh, which occurred some two years after the last, she had a return of the malady in a form more aggravated, if possible, than in the previous attack, which resisted any means employed to stay its progress, and was only subdued by a resort to the same expedient. Thus she who was twice rescued from the very verge of a dreadful insanity, instead of being a maniac, a murderer, or a suicide, is now the centre of the domestic circle, the light of the household, the happy wife and mother of a fond and doting family. Though the course pursued to effect her restoration may, by some, be regarded as of questionable morality, yet the mind must be more crazed than hers that will not admit that the end fully justified the means.

These changes in the mental condition of women, sometimes slight, in others more strongly marked, whether gay or grave, agreeable or otherwise, are often the first signs of pregnancy that are perceived by her family and most intimate companions; and being among the most constant phenomena announcing that state, they are to be regarded as valuable, especially when present with collateral symptoms, of which they are corroborative.

PART SEVENTH.

CHAPTER I.

POSITION OF THE FŒTUS IN UTERO.

THE figure defined by the fœtus in utero, is generally described by authors as an oval. Its extreme long diameter, from the apex to the points of the nates, is rather more than one-third longer than the transverse, at term; but if the curved back be swept with a leg of the dividers from the nates to the point of the shoulder, it will be found to describe an arc of just one-fourth of a circle, which occupies the fundus and body of the uterus; the neck and head, which give to the figure its ovoidal form, occupy the cervix. The organ then is an ovoidal figure, and derives its shape from the general configuration of its contents, the irregularities being filled up by the liquor amnii. (See Fig. 57.)

The head, strongly flexed forward, occupies the lower part of the uterus, or that portion that formerly constituted the cervix, while the breech is found in the fundus, and, in a very large majority of cases, the back is towards the left side of the uterus. The inferior extremities are so doubled up as to occupy the least possible space; the thighs are closely flexed upon the abdomen, the legs upon the thighs, and the feet upon the legs; the heels are placed close together upon the nates, and the upper part of the feet lie against the fore-part of the legs, with their soles upwards.

The arms are placed closely against the sides, while the forearms lie across the breast, crossing each other at the wrists, so as to leave a space for the chin to rest upon the breast. The knees

are separated some distance apart, and are in contact with the elbows.

An opinion was entertained by the ancients, and transmitted from century to century, until it was arrested by Baudelocque, that the fœtus occupied the uterus with its head upwards, with the breech opposite the sacro-vertebral angle, until about the seventh month, when it effected a spontaneous evolution, or, rather, made half a *soubresaut*, placing its head near the os and its breech in the fundus; and in cases of breech presentations at birth, the supposition was, that it either forgot to move at the appointed time, or had no inclination to take a leap in the dark. It is now established as an undisputed fact, that the fœtus, in every stage of its development, occupies the uterus with its head downwards, though some of the German authors continued to defend the old hypothesis, for sometime after its fallacy had been exposed by the great French accoucheur and his cotemporaries. In many autopsies and miscarriages occurring at different stages of pregnancy, the head has been very generally found occupying the inferior part of the uterus; the exceptions to the rule being no more frequent than the occurrence of breech presentations at term.

Various hypothesis have been offered, in explanation of the uniformity of this position. That suggested by Velpeau, viz.: that it is determined by gravitation, is liable to one fatal objection, in so far at least as his mode of explaining it is concerned. He holds that the fœtus is suspended by the umbilical cord, and floats freely in the liquor amnii; that the head, upper extremities, chest, etc., being heavier than the parts below the umbilicus, the head naturally gravitates to the lowest point, while the breech and lower extremities are carried to the fundus. Such might be the case were it correct that the fœtus is suspended by the cord; were this so, the latter would act as a fulcrum upon which the cephalic extremity would necessarily preponderate. But the cord is entirely too long to act as a suspensory ligament for the fœtus; at term the length of the entire uterus from fundus to os does not generally exceed fourteen inches, while the length of the cord is from eighteen to twenty inches—the cord, even at the third month, exceeds in length the long diameter of the uterine cavity; so, under the most favorable circumstances for suspension, there would be five or six

inches of slackened cord. Such suspension, a criminal need not dread, with five or six inches of slack rope between his neck and the gallows. With the slackened cord there can be no suspension, without the suspension there can be no such preponderance as Velpeau maintains.

M. Dubois endeavors to prove that the vertex presentation is a consequence of the instinctive will of the fœtus itself. He holds, moreover, that the object of the foetal movements may be regarded as veritable instinctive determinations, and it is by the effect of such a determination that the head of the mammiferæ is usually found at that part of the uterus nearest to the pelvic outlet. It may be supposed that it was this instinctive will that, in the estimation of the ancients, prompted the fœtus to make its somersault, at the seventh month.

Cazeaux makes no recognition of the superior gravity of the cephalic extremity of the fœtus, but refers the usual apex presentation to the combined actions of both fœtus and uterus. He maintains that the uterus is more largely developed at the fundus and upper part of the body at six months, than it is at the cervix and inferior portion of the body, and that the caudal extremity of the fœtus, being rendered more voluminous, by the folding up of the inferior extremities, than the head. The former is mechanically forced into the largest part of the uterus, which leaves the head in the pendent position. This movement of the fœtus in accommodating its most voluminous part to the largest portion of the uterus, is analogous to that observed in the uterus at the fourth month, when it rises out of the pelvis, to seek better accommodations in the more expansive cavity of the abdomen.

Without having any desire, to combat in the least the more rational explanation given by Cazeaux, we would suggest that, in the very early stage of development, long before the lower extremities exist to give additional volume to the breech, and even long before the breech itself is evolved, gravitation may have something to do in determining the position of the fœtus, without the interference of the suspensory arrangement mentioned by Velpeau. If the student will take the trouble to turn back to Fig. 45, 46, 47, and all the remaining ones illustrating the development of the embryo, he will perceive that its cephalic extremity is not

only the larger, in the first figure mentioned, but it uniformly increases relatively, throughout the whole series, and at the second month the head presents almost as great a superficies, as the entire body besides. Now, according to Cazeaux's showing, viz.: that the most voluminous part of the embryo is forced mechanically to the largest space in the uterine cavity, the head should occupy the fundus, and the caudal extremity, the lesser part of the cavity near the cervix. But as such is found not to be the case, it follows the superior weight of the cephalic extremity of the embryo gravitates itself to the lower part of the uterine cavity, and by the time the inferior extremities become developed, and are folded up, so as to augment the volume of the breech, they, the extremities and breech, are found occupying the fundus, the largest part of the cavity, which affords them ample space for continued growth and development, while the head and upper part of the trunk, by their superior weight, are retained nearest the outlet.

In twin-pregnancies, where one foetus generally presents with the head and the other the breech, gravitation is arrested in case of the latter, by the cephalic extremity of the former occupying the space allotted to it; hence the most voluminous portion, which is the cephalic, is mechanically forced into the largest part of the uterine cavity, which is the fundus, and the breech is wedged down towards the head of its fellow, near the cervix.

In breech and other presentations than the head, we have evidence that in this, as well as any other manifestation of nature, there are occasionally causes existing that interfere with its usual operations, and produce unusual and anomalous results.

CHAPTER II.

OF THE NUTRITION OF THE EMBRYO AND FŒTUS.

PERHAPS there is no subject connected with gestation that is involved in greater obscurity, or upon which there is more disagreement among physiologists, than the means of nutrition of the embryo and foetus; and no clearer evidence need be required of

the hopeless ignorance upon any subject than an irreconcilable disagreement among those who undertake to elucidate it. When there is a clear comprehension of a subject, there is an entire unity of opinion in regard to it; such is very far from being the case in reference to the present one. There has scarcely been an hypothesis ventured, either ancient or modern, that has not been successfully combated; and even alleged proofs, that were supposed to have been derived from actual experiments, have been annihilated by the results of counter-experiments; so, really, we are no nearer a solution of the problem than were our ancestors a century ago. Not but there has been a vast amount of labor devoted to its solution; whole volumes have been written upon it; but as it was not comprehended by the writers, the readers are but little the wiser for what has been written.

In approaching the subject, with a full consciousness of the difficulties that surround it, we shall pay but little attention to the hypotheses, opinions or sayings of others, but proceed to present what is known to exist; and in attempting to give the rationale of certain processes, we shall offer such thoughts as may suggest themselves as we proceed.

We commence the inquiry with the beginning of gestation, or, in fact, a little in advance of it, and study the ovum through its various unfoldings, in view of its nutrition, until a complete circulatory apparatus is evolved, and the foetal circulation established.

It will be recollect that the ovum, while in the Graafian vesicle, is surrounded by the granular cumulus, an accumulation of granules. Fig. 28, 5, 6. The ovum being analogous to the yolk only of the egg of the oviparea, and the granular cumulus to the albuminous or white portion that surrounds it. This albuminous portion of the egg maintains in the yolk the essential properties of germination before, and supplies nutrition to the embryo chick during incubation. The human ovum, in like manner, has its properties favorable to fecundation maintained by the surrounding granular cumulus while it remains in the Graafian vesicle, and in escaping, it is known to drag a portion of it with it, in which it remains enveloped even after it enters the Fallopian tube, and after it becomes fecundated nourishes the primitive embryo during the first phase of its evolution, which takes place in the first half

of the tube. In the absence of any absorbent or vascular arrangement whatever in the vitelline membrane, this nutritive process is effected by simple imbibition. After the ovum has passed the first half of the tube, this layer of glandular matter gradually disappears, and a thick albuminous one takes its place. Fig. 35, 1. This now affords nourishment to the embryo in the same manner as the albuminous portion of the egg supplies nutrition to the embryo chick. After the ovum arrives in the uterus, the necessity for this albuminous layer is less imperative; hence, it becomes perceptibly diminished, as does also the vitelline membrane. The ovum now becoming partly surrounded by new sources of nutrition, viz.: the mucous membrane lining the uterine cavity, the old means of supply can be easily dispensed with. At about the fifteenth or sixteenth day after fecundation, and the formation of the germinating membrane has been completed and the first traces of the embryo are visible, the albuminous layer and vitelline membrane entirely disappear. The newly-developed structure, the germinating or blastodermic membrane, now becomes a medium through which the embryo received a part of its nutrition. This is the proper chorion which is flocculent upon the external surface, and studded all over with villi, giving it the appearance of a velvet-like vesicle. These villi are not hollow tubes, but form certain areolar spongiolas, the evident use of which is to absorb moisture from the uterine cavity, and thus afford partial nourishment to the embryo until the placenta shall become sufficiently developed, and a vascular communication between it and the maternal structures established. When this becomes effected, the embryo draws its sustenance more directly from the mother through the umbilical vessels; the villi then, being of no further use, become atrophied, and finally, between the third and fourth month, entirely disappear leaving the chorion perfectly free and transparent in all its parts, except where the placenta is developed.

As the manner of the formation of the placenta, the evolution of the foetal circulatory system, and its connection with that of the mother have all been studied in detail heretofore, we are more prepared to proceed with the study of the foetal circulation.

CHAPTER III.

OF THE FœTAL CIRCULATION.

PRESUMING the student has studied the anatomy of the adult heart, and that of the general circulatory system, and their structure and functions, he is prepared to notice the difference between these and those of the foetal state. A knowledge of the peculiarities of the latter is essential to a clear comprehension of the course taken by the blood, in distributing nutrition to the foetal economy, during its dependence on the maternal circulation, for its existence and sustenance. Attention is, therefore, invited to these peculiarities, as preliminary to the inquiry into the circulation of the blood during foetal life.

1. *The Heart.* The adult heart is divided into four cavities, two on the right side and two on the left, called the right auricle and right ventricle; those on the left side are called the left auricle and ventricle. Thus the heart is a double organ. The right side is devoted to the pulmonary circulation and has been denominated the pulmonary heart (*cor pulmonare*); and the left side to the circulation of the general system, and may be termed the heart of the system (*cor systemicum*). There is no communication between these sides: but the cavities of each side communicate with each other freely.

In the foetal heart we find a very different arrangement. Between the two auricles, the right and left, which are situated at the base of the organ, and in the adult, are separated by a complete septum or partition; in the foetus there is a large opening, called the foramen ovale or the foramen of Botal, after its discoverer. In Fig. 73 and Fig. 74, taken from Quain and Wilson's Anatomy, representing a foetal heart, at about eight months, from a dried preparation, in the collection of Prof. Joseph Pancoast,

FIG. 73.

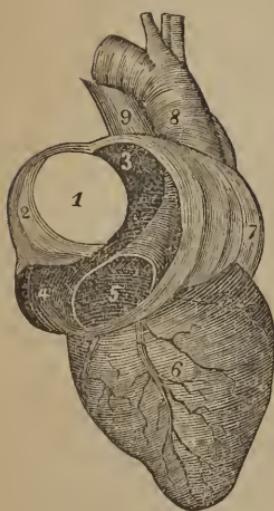
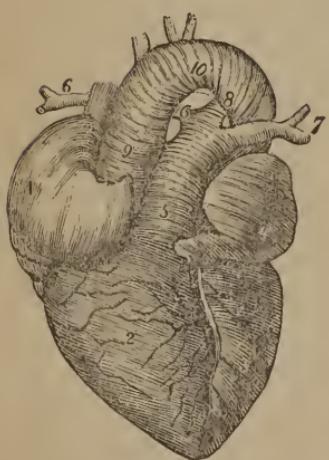


FIG. 74.



the editor of the book, we have a very fine illustration of the anatomical arrangement of the foetal heart, from which the student can obtain a much clearer idea, than could be derived from any description of it that could be written.

Fig 73. 1, The foramen ovale, or foramen of Botal. 2, The incipient septum ovale, which ultimately forms the partition between the two auricles, forming a thin falciform projection upon the posterior wall of the auricles. 3, The entrance of the superior vena cava into the right auricle. 4, The opening of the coronary vein. 5, The auriculo-ventricular opening. 6, The right ventricle. 7, The appendix of the right auricle. 8, The aorta. 9, The descending vena cava.

Fig. 74 gives a front view of the same heart.

1, The right auricle. 2, The right ventricle. 3, The left ventricle. 4, The left auricle. 5, The pulmonary artery. 6, 6, Its right branch. 7, Its left branch. 8, The ductus arteriosus. 9, The ascending aorta. 10, The arch of the aorta giving off its three branches.

There are other anatomical differences besides those of the heart, between the foetus and adult, and without which the foetal circulation could not

be established or carried on, that it is necessary to notice before we attempt to follow the blood in its placento-foetal circuit.

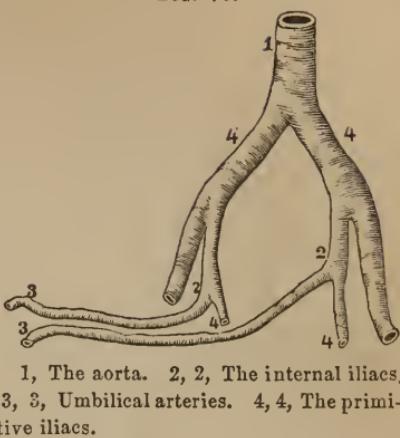
2. *The internal iliac arteries* (Fig. 75, 2, 2,) give off the umbilical arteries, 3, 3, or rather they are a continuation of the large branches of the internal iliacs, the smaller branch, 4, 4, extending down into the pelvis, which, with their branches, supply the pelvic viscera. The umbilical arteries join the umbilical vein at the um-

bilicus, coil around it, until they reach the placenta, where they divide and subdivide into an infinite number of capillary terminations, which enter the tufts of the uterine veins, and there by exosmosis and endosmosis yield the blood they contain to the uterine veins to be carried back again to the heart and lungs of the mother for purification and oxygenization.

After the foetal circulation ceases, with the birth of the child, these arteries become impervious cords; the occlusion commences at the umbilicus and proceeds gradually towards their origin in the internal iliacs. It is affected by a thickening of the coats of the vessels, and generally is complete by the third week of extra-uterine life. The *ductus arteriosus* of the heart, Fig. 74, 8, undergoes the same change, in the same manner, and at about the same time. The foramen of Botal, Fig. 73, 1, also closes, commencing the process immediately after birth, but it is not always complete before the eighth or ninth day, and sometimes remains open until towards the end of the first year. When this closure fails to take place, the child usually becomes the subject of an abnormal condition, known as *morbus cœruleus*, (blue sickness,) of which it generally perishes.

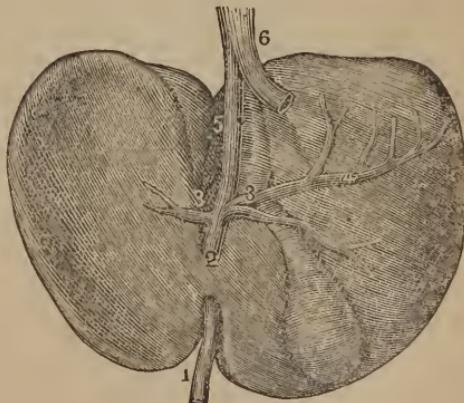
3. *The liver*, also, plays an important part in the foetal circulation, and presents some interesting points in that connection, that are not observed in the state of extra-uterine existence. In Fig. 76, 1, we have the umbilical vein entering the organ at the great fissure, where it remains concealed for a short space, and again emerges, 2. It is then di-

FIG. 75.



1, The aorta. 2, 2, The internal iliacs.
3, 3, Umbilical arteries. 4, 4, The primitive iliacs.

FIG. 76.



vided into three branches, 3, 3, called the hepatic branches; one goes to the right and the other to the left lobe. The one upon the left side gives off a large branch immediately after it leaves the umbilical vein, that is known as the vena portarum, 4. The branch that appears to be a continuation of the umbilical vein, takes the name of the ductus venosus, 5; it enters the ascending vena cava, 6, a short distance below the heart.

The umbilical vein and ductus venosus are serviceable only as affording a portion of the foetal circulatory apparatus, and as soon as the course of the circulation is changed, after the birth of the child, the function of these vessels ceases, and they, like the umbilical arteries, degenerate into impervious cords.

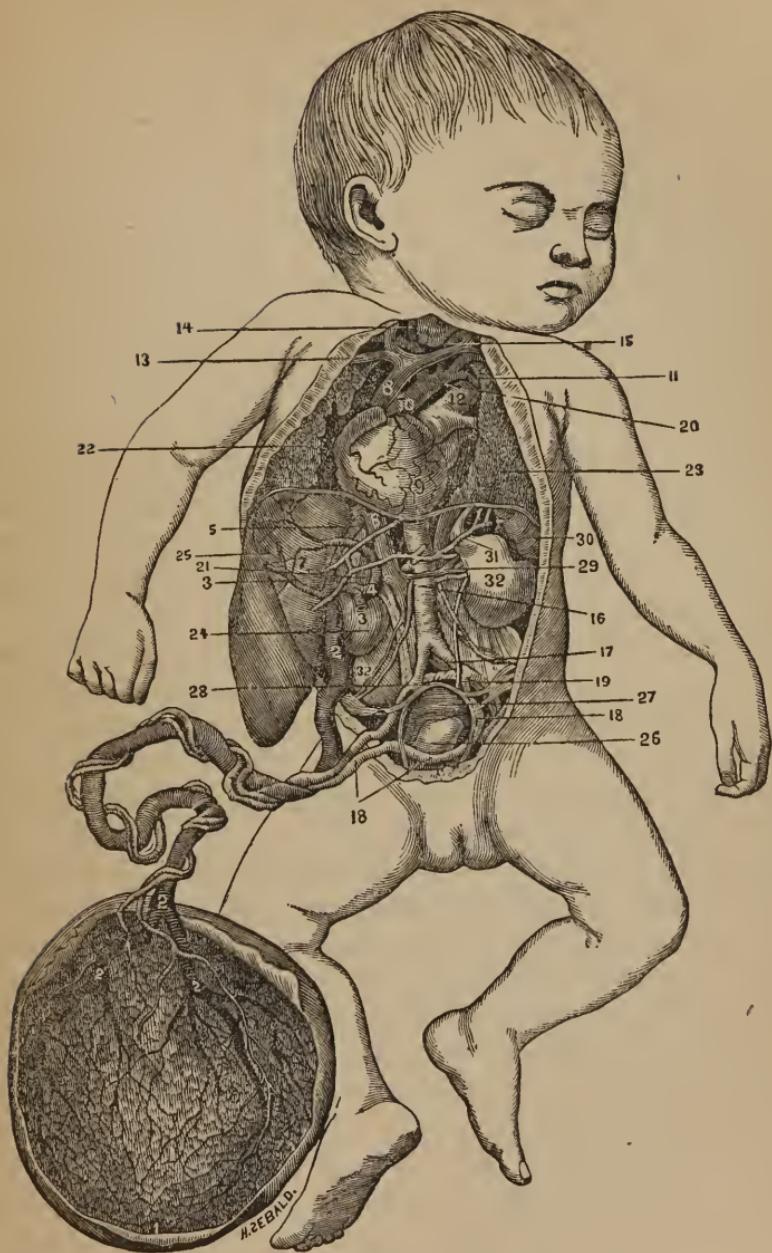
While the obliteration of the umbilical arteries, and the ductus arteriosus, is effected by a thickening of the walls, which gradually increases until they become solid, these venous trunks are effaced in a different manner. After the cord has been divided and the blood ceases to flow through them, the sides come together, and gradually coalesce.

Sometimes, however, the umbilical vein and ductus venosus retain their cavities for a long time, a coalescence failing to take place in due season. A large size probe may, in some instances, be introduced into them, several years after birth. It is not known that the health, in these cases, is in any way affected by the circumstance.

Having studied the different parts especially adapted to the foetal circulation, we propose now to consider them collectively, in connection with their particular functions, and in their relations to other parts entering into the general adult circulatory system.

It will be recollectcd, that while studying the development of the placenta, in connection with its minute structure, it was stated that an infinite number of very small tufts, and sinuses, constitute the parenchyma of the organ. Each of these tufts constitutes the origin of a radical of the umbilical vein, each one sends off a projection, that joins with another, and so on, by running into each other branches are formed, and the branches again joining others, form trunks of larger size, these trunks again unite to form larger ones; so, by a constant convergence from these radical origins, one grand receptacle, viz., the umbilical vein, is formed.

FIG. 77.



FETAL CIRCULATION.

1, Placenta.
2, Umbilical vein.
3, Hepatic branches.

4, Vena partorum.
5, Ductus venosus.
6, Vena cava.

7, Small branches of the vena port.	20, Braehiocephalic trunk.
8, Vena cava superior.	21, Lobulo spigelii.
9, Heart.	22, Right lung,
10, Aorta.	23, Left lung.
11, Left subelavian artery.	24, Kidney.
12, Duetus arteriosus.	25, Liver.
13, Right internal jugular and subelavian veins.	26, Bladder.
14, Braehiocephalic trunk.	27, Womb.
15, Left primitive earotid artery.	28, Upper extremity of the rectum.
16, Abdominal vena cava.	29, The renal arteries and veins.
17, Primitive iliae arteries.	30, Spleen.
18, Umbilical arteries.	31, Splenic artery.
19, External iliae arteries.	32, Kidney.

NOTE.—The left subelavian artery, eoming off from the duetus arteriosus, 12, is not numbered. For the sake of perspicuity, the fibres of the umbilical vein are made circularly, like those of the arteries, instead of longitudinally, like the veins.

The terminal capillary extremities of the uterine artery, unite with the radicals of the umbilical vein in constituting these placental tufts. Into these the maternal blood is emptied, and received by the radicals, to be conveyed into the branches, from the branches into the trunks, and from the trunks into the final vessel, the umbilical vein. From this arrangement, it will be perceived that there is a divergence from the ordinary functions of the veins in so far as this, the umbilical vein carries red arterial, instead of dark venous blood.

4. *The Umbilical Vein*, (Fig. 77, 2, 2,) formed as just described, and freighted with the elements of life for the foetus, leaves the placenta (Fig. 77, 1,) near its centre, enters the foetal abdomen at the umbilicus, and traversing the anterior margin of the suspensory ligament of the liver, enters its substance in its great sinus (Fig. 76, 1). While engaged in the substance of the organ it gives off a few small branches, for its sustenance; it again emerges, 2, and soon divides into three branches, 3, 3, 5; the two first are the hepatic branches, and 5 is the ductus venosus. The hepatic branch on the left side immediately sends off a large twig, 4, called the vena portorum. Nearly two-thirds of its blood is distributed to the liver, through the sinuses of the vena portarum and the small branches (Fig. 77, 7).

As so large a portion of the blood is here disposed of, the ductus venosus, 5, which is a continuation of the umbilical vein, and not more than one-third of its original size, empties into the ascending

vena cava, 6, a short distance below the heart, which it enters by the right auricle (Fig. 74, 1).

The blood distributed to the liver is received by the hepatic veins, and conveyed to the ascending vena cava. The hepatic veins arise in the substance of the liver, and empty into the ascending vena cava; they convey away the blood carried to the liver by the hepatic artery and vena porta in the adult. All the blood conveyed by the umbilical vein, therefore, is emptied into the vena cava, either directly, by the ductus venosus, or indirectly, by the hepatic veins. The blood in the vena cava, consists of a mixture of the pure, that passes directly into it from the ductus venosus, and the impure, that has traversed the liver and lower extremities. This mixture passes into the right auricle from the vena cava ascendens, whence it passes by an almost uninterrupted current through the foramen of Botal (Fig. 73, 1,) into the left auricle, (Fig. 74, 4,) directed, perhaps, in some measure by the Eustacean valve; from the left auricle it goes into the left ventricle, 3, whence, by the contraction of the latter, it is forced through the branches at the arch of the aorta, 10, to the head and upper extremities.

It is received by the veins and returned through the descending vena cava (Fig. 77, 8,) to the right auricle; it has no chance to mingle to any extent with the blood that passes into the same cavity from the ascending vena cava, for the reason already given. Much the larger portion of it passes directly into the right ventricle, (Fig. 74, 2,) by which it is propelled into the pulmonary artery, 7. This vessel sends out a small portion of it to the lungs, but thrusts its main volume into the ductus arteriosus, (Fig. 74, 8; Fig. 77, 12,) which discharges it into the aorta. Thus the blood that has afforded nourishment to the upper parts of the body and has passed through the descending vena cava, the right auricle and ventricle, the pulmonary artery and the ductus arteriosus, finally mingles with the small portion still existing in the descending aorta, along which it all passes to the lower portion of the vessel, when a small part is carried down to the inferior extremities, while the larger part is forced into the umbilical arteries, (Fig. 75, 3, 3; Fig. 77, 18, 18,) and carried back again to the placenta. Here the arteries divide and sub-divide into an infinite

number of branches, and these again into fine capillaries, each of which terminates in a sinus, formed by the terminal extremities of the uterine venous capillaries, which receive the blood emptied into them by the capillaries of the umbilical arteries, and convey it through the maternal venous system to her lungs for oxygenization, to be again distributed in the same manner.

The umbilical arteries, it will be observed, carry impure venous blood, while, as has been before stated, the umbilical vein carries pure arterial blood; thus are the arterial and venous functions reversed.

PART EIGHTH.

CHAPTER I.

ABORTION.

WHEN the product of conception is expelled by the action of the uterus, previously to the age of viability, it is denominated *Abortion*, or *Miscarriage*. Where such expulsion occurs between the period of viability and the natural expiration of pregnancy, it is termed premature delivery.

M. Guillemont gives three varieties of abortions, and classes them according to the period of their occurrence. *Ovular* abortion is the term applied, when it takes place before the twentieth day after conception; *embryonic*, when it occurs between the twentieth day and the last of the third month; and *fætal*, between the latter date and the sixth month, which, as has been elsewhere stated, is the legal age of viability.

Abortions admit of another division, one founded upon the cause of their occurrence, viz.: *Spontaneous*, *Accidental* and *Provoked*.

Spontaneous Abortion, is where it results from disease, either of the woman or ovum.

Accidental, is where it is the result of some external influence, as blows, falls, fatigues, excessive coition, loss of blood, mental emotions, &c.

Provoked, is where it is induced designedly, in view either of a criminal or laudable object.

Abortions occur most frequently in the first pregnancy, and oftener within the first three months than after.

CAUSES OF ABORTION.

Women of a sanguine temperament and plethoric habit, who suffer from menorrhagia and dysmenorrhœa, whose menstrual epochs are attended with much local and constitutional disturbances, are more especially liable to miscarriage; and those who are subject to monthly sanguineous discharges during the early months of pregnancy, are still more exposed to the accident at that period; and the inflammatory and congestive diseases to which persons of this temperament are most obnoxious, often act efficiently in causing the expulsion of the ovum at any period of gestation when they may occur. Hemorrhoids, constipation, diarrhoea, exciting purgatives, etc., often cause abortion.

In women of an opposite temperament, those who are thin and enæmic, or of a scrofulous habit, abortion often occurs, apparently from deficient or impaired nutrition, near the middle of the term.

A constitutional syphilitic taint is often a potential cause of abortion, between the middle and latter part of gestation.

Salivation from mercury has resulted in abortion. Its action is confined to no particular stage of cause, but may prove disastrous whenever it occurs. Nursing during pregnancy may cause abortion in the early stages; depression of the system from disease, or loss of blood from hemorrhoids or otherwise, may produce abortion at any stage of pregnancy. The painful diseases incident to the nervous temperament, as neuralgia, toothache, etc., are excitants of abortion; also, those strongly affected by mental emotions, as anger, grief, joy, chagrin, etc., are more or less subject to miscarriage.

SECTION I.—REFLEX NERVOUS ACTIONS EXPLANATORY OF THE CAUSES OF ABORTION.

Irritation of the trigeminal nerve, as manifested in toothache, and from the painful condition of the mouth in mercurial salivation, may excite the uterus to contraction, and cause the expulsion of its contents.

When the uterine irritation is primarily excited by conception, the teeth, through the reflex irritation of the trigeminal nerve, become painfully affected; hence, the toothache of pregnancy; and

in like manner the salivary glands become excited through the same agency, and we have the salivation of pregnancy.

On the contrary, when the teeth or salivary glands become primarily affected, evincing an irritation of the trigeminal nerve, the uterus in turn receives the reflex influence, and motor action is excited; hence, severe toothache and salivation are often the causes of abortion. The function of the motor nerves of the uterus is to contract the organ.

It has been elsewhere shown that a most decided sympathetic relation exists between the *mammæ* and *uterus*, through the medium of reflex nervous action; that *mammæ* are nearly always responsive to the uterine irritation of menstruation and gestation, which is shown in the increased size and sensibility of the organs. Irritation of the *mammary nerves*, induced by nursing during pregnancy, reacts in a similar way upon the uterine nerves, causing a contraction of the organ, and the consequent expulsion of its contents. Hence, lactation is a cause of abortion, mostly in the early stages of pregnancy.

There appears to be a less perfect reciprocal sympathetic relation existing between the stomach and uterus, than between it and many of the other organs with which it is in sympathy. While the uterine irritation, from pregnancy, very early induces severe nausea and vomiting, primary gastric irritation, however severe it may be, seldom produces any disturbance of the ovum; on the contrary, sickness of the stomach seems positively to favor utero-gestation, in some instances.

A similar want of sympathetic reciprocity is remarkably apparent between the lungs and uterus. Utero-gestation, in a marked degree, retards the development of pulmonary disease; while on the contrary, the most extensive organic lesions of the lungs, attended with their inevitable morbid phenomena, are very seldom, if ever, productive of abortion. Pulmonary consumption, such as may prove fatal very soon after delivery, may exist, without interfering in the least with the natural duration of gestation.

Irritation of the *vesical nerves*, in rare instances, is a cause of abortion, as where pregnancy takes place during the presence of chronic vesical irritation, or where a calculus is present in the bladder, this irritation is augmented by that reflected on the blad-

der by the uterus, which aggravates the primary vesical irritation to an extent sufficient to excite the uterus to contraction by its reflex action.

1. *Irritation of the Ovarian Nerves* is one of the most frequent causes of abortion. In spontaneous abortion, the accident generally occurs at what would have been a menstrual period, had there been no pregnancy to interfere with regular course of ovulation. In such cases it is the ovarian action and the consequent irritation of the ovarian nerves, either alone or in connection with other causes, that excite the uterus to contraction, and consequently to the expulsion of the ovum. The action of the excitor ovarian nerves is precisely the same in these cases, as it is in parturition at the full term. Women frequently can recognize by their feelings the menstrual periods as they progress in gestation, especially the first three or four months this affords one proof that the ovaries are not entirely quiescent at such periods, though pregnancy does prevent the full manifestation of their legitimate functions. Those who suffer from menorrhagia or dysmenorrhœa or who have had some organic ovarian disease antecedent to pregnancy, are they who perceive those periods most plainly, and such are just the ones in whom abortion is most likely to occur. As abortions happen most frequently at what would have been a menstrual epoch, these constitute the most dangerous and critical periods of early pregnancy. When it does take place from the reflex action of the ovarian excitor nerves, it is generally at the second, third or fourth period; and when it is the result of other excitor nerves, or spinal irritation, the periodic ovarian excitement, often determines the time of the accident.

2. *Irritation of the Rectal Nerves* frequently produces abortion. When it occurs during the presence of hemorrhoids, or from operations for their removal, or from the presence of ascarides in the rectum, or severe diarrhœa or dysentery, or obstinate and protracted constipation, or from the action of irritating purgatives, as aloes in excess, the cause is obvious. Any other great irritation of the lower bowel and its excitor nerves may also occasion abortion.

3. *Irritation of the Vaginal Nerves*, occasionally results in abortion. Plugging the vagina is often employed to induce premature

expulsion. Plugging with a view to arrest hemorrhage, when abortion is threatened, often increases the danger by mechanically exciting the nerves of the vagina. This fact should not be forgotten while contemplating the employment of this means of arresting any vaginal hemorrhage during pregnancy. The mechanical irritation and physiological excitement of coitus may produce abortion. But this cause must be divided between the nerves of the os uteri and those of the vagina.

4. *Irritation of the Uterine Nerves*, from whatever cause, is undoubtedly productive of abortions more frequently than any other excitant. A simple arrest in the expansion of the utero, which sometimes occurs, without any other morbid condition of either the uterus or ovum, is occasionally the cause of the accident; here the foetus from its uninterrupted growth presses unduly upon the parieties of the uterus, which refuse to yield further to its demands, causes an irritation of the nerves, which excites the contractions necessary to expel its contents. Again the life of the foetus, from some known or unknown cause, becomes extinct, and all physiological relationship between it and the uterus, at an end; it becomes a foreign substance, and like any other, excites the uterus to contraction, through the irritation of its nerves.

Irritation of the uterine nerves, as is manifested in a natural labor, is a perfect type of all the phenomenal manifestations, pertaining to the expulsive properties of the uterus, let it be excited from whatever cause it may, whether intra or extra uterine, as the death or disease of the foetus; a pathological condition of membranes or placenta; a separation of the placenta from the uterine walls, and the effusion of blood, or puncturing the membranes and evacuating the water, by allowing the uterine parietes to come in direct contact with the foetus, the irritation of the cervix and os uteri; from the succession of the foetal head, in violent horseback and carriage exercises; irritation of the os uteri by coitus; the use of the plug; vascular irritation and inflammation; and ulceration of the os and cervix, the uterine versions, the different tumors, malignant or non-malignant, attached to the os and cervix, or to the parieties of the uterus; the long list of uterine irritations resulting in abortions; and the injuries of the uterus itself from external violence, as falls, blows, concussions, and inflammatory disease

of the uterine tissue, all may sooner or later, in the course of their progress, provoke uterine contraction, through irritation of the uterine nerves.

The presence of the placenta, implanted over the os uteri, is another source of abortion; it excites the uterus from within, in the same manner as the plug from without; hence the frequency with which cases of placenta-prævia terminate in premature delivery. From the growth of the placenta, and the anatomical changes that take place in the os and cervix uteri, the danger of premature expulsion increases with the advance of pregnancy.

Dr. Tyler Smith, to whose expansive and original mind we are indebted for the foregoing physiological views, says: "All these causes, it should be observed, whether vaginal, mammary, vesical, rectal, faecal, or uterine, are purely excito-motor in their operation. The irritation is applied to the excitatory nerves, and reflected *through* the spinal marrow *upon* the motor nerves of the uterus. It often occurs that two or more causes are in operation at the same time. The reflex contractions of the uterus which constitute abortion, are not excited, as in case of respiration or vomiting, immediately on the application of the stimuli. If cold water be thrown upon the breast the movements of inspiration, if the fauces are irritated, the movements of vomiting are instantly produced.

"But it is not thus in the case of the uterus. Though this organ is so indirectly under the control of the spinal marrow during and immediately after labor, so distinctly, indeed, that merely asperging the abdominal surface with cold water soon after delivery produces instantaneous contractions, yet during pregnancy, no reflex actions sufficient to cause abortion follow immediately upon the application of the ordinary stimuli of excitatory-motion action. It requires that the nervous arcs in relation to the uterus should be irritated for a considerable time, and an excitable, or changed state of the uterine nervous system is then produced, during which reflex actions are readily excited by slight causes.

"The nervous arcs presiding over parturition, are to a certain extent isolated from the rest of the spinal system. If it were not so, and if the uterus immediately obeyed an excitatory stimulus, like the stomach or the respiratory muscles, abortion would be the rule, normal parturition the exception. There are certain facts which

show this independence of the nervi-motor apparatus of ovi-expulsion in a remarkable manner. I may mention one fact and one experiment, both of which I owe to Dr. Marshall Hall. Dupuytren relates the case of a woman who became the subject of traumatic tetanus during pregnancy; but who, nevertheless, recovering from the tetanus, passed to the end of utero-gestation without aborting. A frog, taken during the time the oviduct was full of ova, was rendered tetanic by strychnia for a considerable time; the ova were not expelled during the presence of the tetanoid symptoms, but several days afterwards, when they had entirely disappeared, expulsion took place in the ordinary way. It is well known how difficult it is to induce uterine contractions with the ergot of rye before the time of parturition, though this agent has a special action upon the nervi-motor actions of the uterus. All these facts prove the independence and seclusion of the nervi-motor apparatus of ovi-expulsion, until the appearance of the exciting causes of labor. When this epoch has arrived, or when the excitability of the uterine nervous system is roused, as in cases of abortion, the ready answer of the uterus to stimuli is as remarkable as was its previous indifference."

"All the excito-motor causes of abortion are, in fact, imitations of the ovario-excitor causes of natural parturition at the end of utero-gestation; only, in many cases, instead of the ovarian nerves being the inducers of the uterine nervous excitability which terminates in premature expulsion, it is the mammary, vaginal, rectal, etc. In the instances where ovarian irritation is the cause of abortion, the cause of abortion is precisely the same and acts in the same manner as the cause of natural labor, the only difference being that of *time*. I have said that oftentimes more than one cause of abortion is in operation; thus, uterine irritation may produce the irritability or excitability of the uterine nervous system, but before their irritability has actually produced expulsion, irritation of the rectum may step in and complete the abortion. One point I would insist on most emphatically, namely, that in cases of vesical irritation, or rectal irritation, we cannot correctly talk of the extension of nervous irritability from these organs to the uterus, by structural contiguity and continuity, or because they are supplied by nerves from the same source. Vas-

cular phenomena may so extend from one organ to another in the same vicinity, but nervi-motor phenomena never can do so. There are abundant vascular anastomoses to account for such extensions of vascular phenomena, but there are no anastomoses of nervous fibrils. However close the irritation may be to the motor organ, all the motor action which does not depend upon irritation of the muscular fibres, or upon sensation or emotion, is reflex in its form. The uterine contractions of abortion caused by irritations of the rectum and bladder, nay, even of the uterus itself, is as truly reflex and spiral as the uterine contractions excited by trifacial, gastric or mammary irritation. I insist on this point, because I frequently observe relaters of cases speaking of motor sympathies between the bladder, uterus, and rectum, as though there was some short cut between these organs, whereas there is no motor connection or route whatever except it be *through* the spinal centre, and by way of the excitor and motor nerves. In all these is the excitor nerve, the spinal centre, and the reflex motor nerve concerned; at one end of the nervous arc there is the physical irritation; at the other, the motor contraction. As in all other cases of excito-motor action, sensation may be present; but it is by no means essential. Physical irritation of the excitor surfaces, short of sensation or pain, may produce the entire phenomena of abortion. This is one of the facts which renders the due recognition of all the excito-motor causes of abortion so essential to the prevention and treatment of this accident.

We may look on abortion as, in some points of view, comparable with spasmodyc asthma, or any other excito-motor disease. From some irritating cause, an excitable condition of the excito-motor arcs presiding over parturition is induced, just as in the case of asthma, where it is the respiratory nervous arcs which are rendered excitable. This state of excitability once induced, slight causes of irritation, which in healthy subjects would produce no disturbance whatever, are sufficient to produce in one case, spasmodyc respiration; in the other, morbid or spasmodyc parturition. Besides the ordinary periodicity of abortion, namely, the tendency to premature expulsion at the catamenial dates, there is another remarkable periodicity observable in abortion, in the tendency to the occurrence of miscarriage in successive pregnancies at a particular time.

It often happens that we may see in these cases the obvious physical causes of abortion developed at the special times; but in others there seems to be a habit, or predisposition, the nature of which we cannot so well understand."

What we have given under this heading, as reflex nervous action, explanatory of the causes of abortion, Dr. Smith denominates the "excentric causes of abortion, to which are referable all cases where the excitor nerves are primarily involved, and where the accident is due to the excito-motor action of those nerves. There is quite a large class of abortions, that owe their origin to other than irritation of the excitor nerves in which are involved only the circulation and the spinal centres, where a specific poison is carried in the blood to the spinal centre, arousing uterine nervi-motor action sufficient to contract the uterus and expel its contents, independent of the excitor nerves. Dr. Smith calls these excito-motor phenomena the "centric causes of abortion," while really they are but manifestations of the *modus operandi* of the more remote causes that put them in motion. There is a morbid condition of the system induced by the presence of a specific poison, as in the exanthemata, especially small-pox, which renders abortion particularly liable, by introducing a specific poison into the blood; the virus of syphilis and the taint of scrofula are amongst the most efficient centric causes of abortion, by polluting the blood, and through it exciting the spinal centre; the febrile condition of the system, initiatory of the non-specific fevers, and simple inflammation of the viscera, also invalidate the certainty of a normal retention of the ovum. The inhalation of carbonic acid rapidly excites abortion. Poisoning by this gas, whether intentional or accidental, is often attended with an expulsion of the ovum. A great number of Arabian women who were suffocated in the caves of Dahra, during the celebrated plundering incursion by the Algernines, who were pregnant were found to have aborted. Similar examples are furnished by the military history of other countries. It is believed that the retention of the noxious elements in the blood, in the albuminuria of pregnancy, are the cause of abortion as well as puerperal convulsions. It is known that the use of certain specific agents, as the essential oil of savin, the ergot of rye, and recently the gossippium herbaceum, if persisted in, is capable

of causing abortion. In fact all poisons, when freely administered during pregnancy, may cause abortion as well as destroy the woman. In all the foregoing instances the poison is carried by the blood to the spinal centre. They are precisely similar to the artificial abortion which may be excited in the lower animals by direct mechanical irritation of the spinal marrow.

4. *Emotion* is another important cause of abortion, acting through the spinal centre. This cause is purely *psychical*; in this it is different from those causes which reach the spinal centre through the blood. The influence of emotion in causing the uterus to contract and evacuate its contents, is as certain, as the influence of emotion upon any of the other sphincters, as those of the stomach, rectum and vagina. But just as in the case of uterine excitor-motor action, ordinary emotion does not affect the uterus instantaneously. Time is generally required for its effects to develop themselves into uterine excitability. The rapidity of the action of emotion, is in proportion to its intensity. A violent fit of anger, intense grief, or serious fright, may produce abortion, some days after the violence of the emotion has subsided, or the uterine action follows almost immediately upon the emotional excitement. From excessive terror, women have miscarried suddenly at the stake during religious persecutions. This shows that under extreme circumstances, the emotions may act upon the uterus, and cause abortion, even more readily than excito-motor causes.

In treating upon abortions, the tendency of authors has always been to refer the accident to some particular and almost universal cause. For instance, abortion at one time is attributed to disease of the ovum; at another, to a scrofulous diathesis; and again to disease of the os uteri. By taking this course, it seldom occurs that *all* the manifold causes, the study and recognition of which are necessary to success in practice, are presented for the investigations of the student. Dr. T. Smith says: "The mechanism by which abortion, or the premature expulsion of the ovum, is effected, varies considerably according to the time, between conception and natural parturition, at which the accident occurs. When the impregnated ovum is lost immediately after conception, the phenomena are very similar to the menstrual period; when the abortion occurs in the latter months of utero-gestation, it resembles natural

parturition. In abortion at various intervals between conception and parturition, the nearer it is to conception, the more it appears like menstruation; the nearer it is to parturition, the more closely is it imitative of that process. In the earlier abortions, where conception has preceded a menstrual period, the motor actions of expulsion are chiefly confined to the Fallopian tube, there is little motor action of the uterus, either of dilatation or contraction, the ovum being washed away by the menstrual fluid. An exception must however be made in the case of women who have borne several children, in whom the uterus is sometimes a contractile organ, even during menstruation. Usually the uterus does not contract with any force during the first two or three months, or abortion would probably be far more frequent than it is. Abortion at this time is rather a mechanical dislodgment, by the separation of the ovum from the uterine parietes, than a distinct motor act of expulsion. After the ovum becoming separated from the uterus, has entered the vagina, it excites expulsive action of the abdominal muscles, similar to those of micturition and defecation. When quickening,* or the first peristaltic movement of the uterus, has occurred, the uterus dilates and contracts as in natural parturition, only less perfectly; and abortion becomes gradually divisible into the different stages of natural parturition. There is the dilatation of the os uteri, the distinct contraction of the uterus at intervals, or in pains, and the bearing down, or expiratory actions which expel the ovum from the vagina. The condition in which the ovum is expelled varies also according to the time at which it takes place; in the early months the ovum is expelled entire, except when decomposition has taken place, the foetus being involved in the membranes; but as utero-gestation advances, the membranes are often ruptured during expulsion, as in natural labor, and the foetus and secundines all discharge separately."

SECTION II.—SYMPTOMS OF ABORTION.

In studying the symptoms of abortion, it is necessary that one very important fact should be borne in mind, and that is, the phe-

* Let it be remembered that Dr. Smith, does not admit that quickening is the result of foetal movements, but that it consists of spasmodic or peristaltic motions of the uterus itself.

nomena of abortion resemble those of menstruation or parturition, in proportion as the accident approaches the time of either of these normal functions.

1. *Ovular abortions*, therefore, which occur within twenty days after conception, resemble menstruation. This class is preceded by a very few symptoms, and these are of a character so mild, as hardly to arrest the attention of the patient. There may be a slight headache, with a trifling sensation of chilliness followed by some flashes of heat, an uneasiness, scarcely amounting to pain, in the back, and a sense of heaviness in the pelvis; all of which are nothing more than what is generally experienced at the approach of an ordinary menstrual period. A circumstance most likely to arrest attention and excite suspicion, is the appearance of, at first a slight, very pale, then deeper, and in the course of three or four days, a freer sanguineous discharge from the vagina, at a time unusual for the menses. This generally continues, with more or less intermission, for one or two weeks, or until the arrival of the cata-menial epoch, when the symptoms culminate in a menstrual effort of unusual severity, being attended with greater pain, and a more copious flow than common, and frequently accompanied by coagula, amongst, or incorporated with which, upon close inspection, some debries or membranous shreds may be observed. After these pass the hemorrhage subsides, and what pain was present ceases; and the patient experiences no more inconvenience than generally follows an attack of dysmenorrhœa. These are the miniature symptoms of abortions of more advanced periods.

2. *Embryonic abortions*, which occur between the twentieth day and the third month, are announced by a more decided manifestation of the foregoing symptoms, and the addition of some others, showing a more general disturbance of the whole system. There is, however, a difference in the symptoms, which in a measure corresponds with the nature of the cause producing the accident; thus, where it is spontaneous and results from some lesion of health in the woman, or pathological condition of the ovum, the incursion of the symptoms is very slow; at first consisting in the slightest deviation from general health, but gradually becoming more and more marked as the miscarriage approaches. In addition to the headache, shivering and heat, and pain in the back,

there is loss of appetite, nausea, thirst, a desire for acid drinks as lemonade, languor, pallor, cold hands and feet, depression of spirits, dulness of the eyes, a sinking sensation at the epigastrium, dysuria with tenesmus of the bladder, etc. These symptoms last two or three days, during which the patient is able to keep about, most, if not all the time, but feels miserably, and scarcely suspects what the matter is, until the pains in the loins become more severe and extend round to the hypogastrium, and begin to alternate with moments of ease, with an increased discharge from the vagina. These signs arouse her suspicion as to the real state of the case, and in a few hours, after two or three sharp forcing pains, the contents of the uterus are expelled, and the patient enjoys immediate immunity from further suffering. Where the accident occurs between the second and third month, the embryo will be found to be tolerably well formed, and from two and a half to three inches in length. The ovum may pass entire; in that case very little or no further trouble follows. But the membranes, at this period of gestation, are so very thin and delicate, they are apt to rupture during the process of expulsion, and the embryo to escape alone, leaving the secundines in the uterine cavity. Usually most of the trouble of an abortion, at this period, is caused by their retention, which is attended with a continuation of pain and hemorrhage. Sometimes they pass in an hour or two, by the spontaneous action of the uterus; at other times they may be retained for several days. Some years ago we had charge of a case, where the secundines were retained for three months. The retention was attended with neither pain nor hemorrhage; they escaped one evening, in a shrivelled, firm, contracted form, while the lady was in church, with but one slight pain and but little subsequent discharge. During this protracted retention the patient enjoyed tolerably good, but not her usual excellent health; complained occasionally of languor and nervousness, but was generally cheerful and of good spirits. When pain and hemorrhage attend the retention of the secundines, it is evident their separation from the parietes of the uterus is not complete, while an absence of these symptoms shows that all physiological relation between the uterus and its contents has been dissolved, and that the latter occupy the cavity of the former, only as a foreign substance, which in time, earlier or later,

will arouse the exito-motor action of the uterus, and cause its expulsion. Generally, where the pain and hemorrhage continue after the escape of the embryo, the os uteri remains dilated, and even continues to dilate still more, to allow the exit of the rudimental placenta and membranes, which require more space to pass, than the embryo alone; while in those cases where the symptoms cease with the escape of the embryo, and the secundines are retained, the os uteri generally contracts almost immediately after the expulsion of the former, and remains in a state of normal contraction, until a re-occurrence of the excito-motor action of the uterus again causes its dilatation, as at first. Where there is evidence of a complete separation of the secundines, as an absence of pain and hemorrhage, and the os uteri remains sufficiently dilated to allow of the admission of atmospheric air, the uterine contents soon undergo decomposition and pass off by a foetid sanguous discharge containing bits of partially decomposed fleshy substance. It often requires several days to complete the escape of the retained mass by this process, during which time the health of the woman suffers more seriously than at any other stage of the abortion, and requires to be sustained by tonics, nutritious diet, etc. The hemorrhages in these cases may be considerable, and when continued a long time may cause a degree of debility, not to be coveted, but from the smallness of the uterine vessels, it is very seldom sufficient to prove fatal, unless allowed to continue unabated an undue length of time.

In accidental abortions, or those resulting from some personal violence received, occurring at this stage of gestation, there is often quite a different course observed; sometimes the escape of the ovum follows the injury in rapid succession. This is the case with some particular accidents more than others. Those that come with great suddenness, and are accompanied by a corresponding mental shock, as of terror or alarm, are apt to be the most speedy in their termination. For instance, a woman may be gliding briskly along the walk, with her mind preoccupied, and anticipating no danger, her feet suddenly slip from under her and she falls with her whole weight upon her buttocks; perhaps, at the same moment, uttering a loud cry of alarm, upon rising she finds her clothes are saturated with blood; she feels weak and painful, partly

from the loss of blood, and partly from the mental shock ; after one or two sharp twinges, upon examination, an ovum will be found to have passed. In such instances, the slow process of dilatation is superseded by the sudden reflex excito-motor action of the uterus, induced by the combined action of the excitor nerves aroused by the injury, and the emotion influencing the spinal centre directly.

The recovery from these sudden physico-mental mishaps, depends a great deal upon the temperament and constitution of the patient. There is seldom much subsequent hemorrhage, and often in two or three days the recovery is complete, while in others, more delicately constituted, and with a more exalted sensibility of the nervous system, become so depressed from the mental and physical shock, that weeks are required before they get entirely over it.

It more commonly occurs, that the abortion follows the accident or fright a few days after it has happened ; such cases bear a stronger resemblance to spontaneous abortions, in their phenomena and termination.

3. *Fœtal abortions*, are those that take place between the last of the third month, and the period of viability. This variety includes the middle of pregnancy—a point in the process of gestation equidistant between conception and natural labor ; when the phenomena of expulsion are not allied to either those of menstruation or parturition, but where the dangers of both earlier miscarriage and later premature delivery are combined. It is, therefore, the period fraught with the most peril to the woman ; and observation confirms the correctness of this assertion, for abortions that prove fatal, are generally those of this variety. Abortions occurring at this period, are deprived alike of the advantages of the milder phenomena pertaining to menstruation, and the physiological provisions incident to natural labor. The bulk that is to be expelled, requires a greater amount of dilatation of the os and cervix uteri, than a smaller body of an earlier period, and the ramolescence of the parts, characteristic of their fitness for normal parturition, is not present, to favor an easy and speedy dilatation. Hence a longer time and a greater amount of pain is very often required to effect the expulsion of a fœtus, at four and a half or five months, than is experienced in giving birth to a child at nine. It is not

the length of time involved, and the sufferings endured during the process of the abortion alone, that should excite our apprehensions in regard to the safe termination of miscarriages at this period; the after consequences are often more to be dreaded than these. The vessels of the uterus are now larger than they have been at any previous period, and consequently they are traversed by a greater quantity of blood—this increases the danger of flooding. And where the placenta is but partially detached, and retained after the expulsion of the foetus, hemorrhage is almost inevitable, and, to an extent, sometimes truly alarming and even fatal. The smallness of the os uteri prevents the introduction of the hand, and the placenta is usually too high up to be reached by the finger, so a great deal of time is often consumed in inefficient and useless efforts to dislodge it, while the blood is flowing at a fearful rate, which not unfrequently proves fatal.

Where this unfavorable result is escaped, frequently another and a more dangerous one awaits the unfortunate woman. The violent shock sustained by the system from the intense and protracted suffering, predisposes it to inflammation; this, often united with other predisposing causes, gives rise to metritis or peritonitis, or both, which renders her situation exceedingly precarious.

When this variety occurs spontaneously, the initiatory symptoms do not differ widely from those that announce the incursion of embryonic abortion. They gradually become more and more marked, and the pains assume all the characteristics of regular uterine contractions. During these, if the hand be laid over the uterus, immediately above the pubis, an increased hardness will be readily perceived, which will pass off as the pain subsides. At the same time the vaginal touch will reveal an enlargement of the neck of the uterus, and if the process be sufficiently advanced, a dilatation of the os to a greater or less extent will be perceived, in which will be found engaged the protruding membranes. These in due time rupture and the foetus is expelled, which is followed shortly by the spontaneous escape of the placenta; under favorable circumstances, in a fortnight the patient will be able to resume her usual duties. This is the most fortunate termination of such a case that should be anticipated, but it cannot be effected without a great amount of suffering. Nevertheless the condition of the os and cer-

vix uteri, determines to a great extent the quality and quantity of the pains, necessary to expel the foetus. Sometimes there is a marked difference in the ramollescence of these parts during the whole term of gestation. When they are hard, firm and unyielding, a much longer time and much harder pains are required to effect a sufficient dilatation to admit of the passage of the foetus. On the contrary, where there is a greater degree of softness and pliability, there is a corresponding speed and facility in its expulsion.

In accidental abortions occurring at this period, the escape of the foetus never follows the accident so rapidly, as does the ovum or embryo; the contents of the uterus being so much more bulky, a much greater amount of dilatation is required, to enable it to pass, and more or less time must elapse before this can be effected.

An accident sufficiently grave to cause an abortion, may affect injuriously either the woman or foetus. In case of the former, the injury may be received at a distant part of the system, and disturb the uterus through reflexed nervous action, and emotion; or it may be sustained by the uterus, direct. In the latter case it may be of such a character as to destroy the life of the foetus, either immediately by its direct application, or mediately by supervening inflammation, hemorrhage or some other equally destructive agency. Where it results from harm sustained by the woman, the only symptoms following the accident immediately, are perhaps two or three sharp, short pains through the loins, and a slight sanguineous discharge from the vagina; these generally pass over at the time and the patient thinks she has escaped any serious consequence. In a few days, however, she may be suddenly attacked with a severe chill, followed by high fever and a violent headache, flushed face, thirst, etc. During the febrile state, uneasiness and pain in the back are experienced, and a show, more or less copious, is observed from the vulva; in two or three hours the fever subsides, giving place to a free perspiration and a suspension of the pain in the back, and perhaps the vaginal discharge. In a few hours there is a repetition of the foregoing symptoms, with probably increased severity. These may subside again, as in the first instance, or the subsidence of the fever may be followed by regular pains, strongly resembling those of ordinary labor, which, after a longer or shorter continuance, and of greater or less severity, may

terminate in the expulsion of the foetus, probably alive, followed in due time by the escape of the secundines. Or the second chill may not ensue, but the expulsive action of the uterus follow immediately the first febrile paroxysm. Or there may be three or four of these paroxysms, before the nervi-motor action of the uterus becomes fully established.

These phenomena, however, do not always attend accidental abortions. Symptoms resembling those of the spontaneous class are frequently present in their stead.

Where the death of the foetus has resulted from the injury received, there are certain phenomena pertaining to it, that are not present in cases where its life has been preserved up to the hour of expulsion. Usually after the fright, commotion and physical disturbance have subsided, during which more or less pain and inconvenience are experienced through the uterine region, there is generally but little if any perceptible change in the condition of the woman, for some days, often eight or ten; when evidences of the death of the foetus become manifest. Should the accident occur before the period of quickening, the woman will complain of pain, more or less, through the pelvis, with a sensation of *weight* and bearing down, which may be followed by a discharge, either serous, sanguineous, or sanguinolent, at first, then of pure blood, from the vagina. Where pregnancy has advanced to quickening, or beyond that period, the foetal motions will often be felt in an unusually violent degree, and then cease entirely. Sometimes this occurs immediately after the accident, or simultaneously with the existence of the cause producing the death of the foetus. As we have elsewhere stated, we were once present with a lady in convulsions, where pregnancy had advanced to the seventh month. In the midst of a very severe fit, our attention was directed to a most tumultuous agitation of the abdomen, which was plainly visible through her clothing, and she had on her ordinary day apparel. Upon placing the hand upon the abdomen, the most violent contortions of the foetus, passing through its death struggles, were distinctly felt. Two weeks afterwards, during which no motions were perceived, it was expelled, partially decomposed, after a very short and remarkably easy labor.

Often, however, the death of the foetus is not so sudden, nor

marked by such unequivocal signs. Where the movements have been distinctly observed before the accident, immediately, or some days after, the woman perceives the foetal motions to decrease in strength from time to time, and to recur at greater and still greater intervals, until they finally cease altogether. After the death of the foetus, abortion is inevitable, because it is now a foreign body, and will sooner or later arouse the excito-motor action of the uterus, and be expelled. The time that elapses between the death of the foetus and its expulsion, is by no means uniform; it is sometimes one, two, three or even four weeks. Cazeaux mentions a case that came under his observation, where the foetus was retained six weeks after all signs of life were extinct. There are numerous cases recorded of such retentions until the full term, without any material injury to the woman.

Generally the placenta-uterine circulation ceases upon the death of the foetus, but this is not always the case; for sometimes it continues, and the placenta continues to grow until it acquires twice its natural size at full term, with a living foetus.

A dead foetus may remain in utero for several months, without decomposing, where the membranes remain entire, owing probably to its exclusion from atmospheric air.

After the foetus has been dead for some days, the phenomena attending its expulsion, are generally of a milder character than when it is alive and in full health; the dissolution of the physiological relations, existing between the foetus and uterus, evidently predisposes the latter to part with a dead foreign mass, with more facility than with a living organized body, with which it is so intimately connected. The expulsion is generally effected without very severe pains, in a comparatively short time, and seldom with any subsequent hemorrhage or inflammation.

Where a dead foetus is expelled, within a few days after the accident, and where the woman has sustained no personal injury, the symptoms do not vary materially from those of spontaneous abortion, occurring at the same stage of pregnancy.

But where the foetus is retained an undue length of time, and where the accident causing its death, is attended with, or shortly followed by, a rupturing of the membranes, so as to allow the atmospheric air to come in contact with their contents, a very different

state of things may be encountered, which will probably be announced by a thin, foetid, sanguous discharge from the vagina, containing more or less decomposed fleshy masses, of variable sizes, showing that the foetus is undergoing a rapid putrefaction. High fever of a malignant type is apt to supervene, which, from its incorrigibility, marks the presence of a specific infection, and which will soon destroy the patient, unless efficient uterine contractions come to the rescue, and promptly expel the mass of corruption from the deleterious influence, of which the present suffering and danger emanate.

But the decomposition of the foetus in utero is not always attended by such disastrous consequences, for a dark foetid discharge is often kept up for several days, in which is contained large quantities of decayed foetal structures, until, finally, the motor action of the uterus becomes excited, and the residue of the loathsome mass expelled at once.

In case of twins, where one foetus be living and the other dead, and abortion ensues, both foetus are generally expelled, one following the other in quick succession; but there are instances where the dead one has been expelled and the living one retained, and continued to grow, and at the full term brought forth of a natural size.

4. *Premature delivery.* This is when the foetus is expelled between the period of viability and the normal termination of pregnancy at nine months. The phenomena of this variety are so analogous to those of normal labor, that it is unnecessary to dwell upon them at length in this place, as the whole field of labor will be brought into view and presented for study at the proper time.

The causes producing premature delivery, are the same as those that result in abortion during the earlier stages of pregnancy, to which, perhaps, may be added one or two others.

Premature labor has been attributed to irritation of the uterus from distention, during the latter weeks of pregnancy, and especially is it liable to result from this cause in case of compound pregnancies; twins are often born prematurely, but such is more frequently the case in regard to triplets; quadruplets are seldom retained until the full term, and six months is the longest time, of which we have any authentic account, of quintuplets being retained

in utero. Where premature labor occurs in compound pregnancies it, in most cases, doubtlessly results from this cause.

Tension of the abdominal muscles, during the latter part of gestation, has also been assigned as a cause of premature labor.

It has also been attributed to the sinking down of the uterus into the pelvis, where this organ possesses undue amplitude.

When it occurs from either of the latter causes, it cannot, correctly, be regarded as the result of disease, either of the woman or foetus, though it be spontaneous. These must be viewed rather in the light of mechanical, than of physiological, pathological or accidental causes. The symptoms of premature labor, originating in either of the foregoing conditions, are different from those announcing the approach of an expulsion of the foetus, from either of the previously considered causes. These being so nearly allied to those of natural labor in identity, we shall not give a description of them, until we come to speak of the symptoms of that process, in which they will be included.

5. *Provoked or induced abortion.* As this can only be regarded legitimately, as a prophylactic measure, to be employed to secure the woman, or both woman and child, against fatal or dangerous consequences, if gestation be allowed to proceed, we shall reserve the consideration of it for a subsequent part of the work, when these consequences, and the means of their avoidance, will come under discussion.

6. *Diagnosis.* The premonitory signs of abortion, in early pregnancy, are so very obscure, and bear so strong a resemblance to those of dysmenorrhœa, and other irregular complications of menstruation, that to make a correct diagnosis of the case, in time to hope to avert the evil, is extremely difficult and uncertain. While the matter of gestation itself remains in doubt, how can its arrest, or interruption be determined with certainty, until it has advanced so far, as to become a matter of indifference, so far as the possibility of remedying it is concerned, whether the exact condition is ascertained or not?

Madame LaChapell has given some signs, which may be serviceable, in a degree, in making out the case, but the instances to which they are applicable, are limited; she says, the pains, in abortion, preceded the hemorrhage, and persist, notwithstanding its

abundance, and the os uteri is open; while in difficult menstruation the pains are worse before the escape of the accumulated blood in the uterine cavity, but diminish, or cease altogether, after the discharge has become established, and the os uterus is closed. Now, these relations of the pain to the hemorrhage, are not uniform, by any means. Sometimes they appear to be present during an attack, at other times, no regularity is to be observed whatever.

During the menstrual derangement, the os uteri is very often patulous and open. This is more particularly the case in women who have borne children, while in abortion in *primipara*, though the hemorrhage be free, and the pain annoying, the small, round orifice of the uterus may present no marked modification. Though functional derangements of the organ are sometimes attended with a loose, open condition, when not impregnated, so the os uteri, in the ovular stage, affords no certain means of diagnosis, in spontaneous abortions. Where pain and hemorrhage follow an accident, or fright, or any other strong mental or excessive exercise or exertion, etc., either immediately or in a few days, where pregnancy is suspected, very strong grounds for the suspicion of abortion are presented, and we should act accordingly.

During the *embryonic stage*, where the symptoms of abortion succeed any physical injury, or unusual exertion, or mental phenomena, they should receive early and prompt attention; and where the symptoms of pregnancy, incident to this stage, as morning sickness, etc., are suddenly suspended, with a sense of weight and coldness in the lower part of the abdomen, flaccidity of the breasts, pain in the back and loins, and bloody discharge from the vagina, we may calculate the embryo is dead, and that an abortion is inevitable.

During the *fœtal stage* of pregnancy, the foregoing or corresponding signs, occurring under similar circumstances, connected with an absence of fœtal motion, and a silence of the fœtal heart, are strong evidences of an impending abortion.

The signs of *premature delivery*, correspond to those of abortion during the *fœtal stage* when it occurs near that stage, and to those of natural labor, the nearer it approaches that period. The earlier it occurs after viability, the more apt the pains are to be short and inefficient in causing a dilatation of the os uteri, and the process of expulsion is of longer duration than where it occurs nearer the

natural termination of gestation. The sharpness and inefficiency of the pain are due, probably, to their neuralgic character, and the duration of the process, to the rigidity of the uterine structures and the inefficiency of the pains. But the nearer gestation approaches its normal termination, the signs of premature expulsion correspondingly resemble those of natural labor; for instance, the pains are less severe and more efficient, the os yields more readily to the uterine contractions, and the vaginal discharges resemble more the natural show than the hemorrhages of abortion in the earlier stages.

The pains of premature labor are often attended with nausea, vomiting and a sense of fainting, and sometimes with more or less general fever and symptoms of local inflammatory action; there is often great irritation of the bladder, and a frequent desire to void urine; the pulse is mostly agitated, being quick and small and resisting to the finger.

Where abortion occurs during the foetal stage, or premature labor, after the period of viability, if the os uteri be sufficiently dilated to admit the end of the finger, the advancing membranes may be distinctly felt, upon the incursion of each pain. They will present to the touch a dense elastic body, which will continue in contact with the finger during the continuance of the pain and then recede, and not be present again, until the succeeding contraction forces them down. If the unoccupied hand be laid upon the abdomen immediately above the pubis and a tolerably firm pressure made, the uterus will be found to become hard, simultaneously with the protrusion of the membranes. In case of a softening and dilatation of the os uteri during an attack of dysmenorrhœa, a very different presentation will be observed by the touch. The os and cervix will be found to be unoccupied, or filled with a mass of coagulated blood. This will be distinguished from the protruding membranes, by the uniformity of its condition both during the presence and absence of pain. Instead of the density and elasticity of the cone-shaped projection during a pain, there will be observed no change, either in the shape or condition of the presenting body, nor will there be a recession from the finger as the pain subsides. On the contrary there will be a uniform, doughy inelastic substance in contact with the exploring finger, both during the pre-

sence and absence of pain. Threatened abortion and premature delivery are distinguished by two characteristic symptoms, viz.: pain and hemorrhage; and although these must be present in a greater or less degree, in every instance of premature expulsion, yet neither of them alone nor both combined, are sufficient to constitute certain diagnostic signs that such will actually take place. Every practitioner is familiar with the fact that hemorrhages frequently occur during gestation, and often to a considerable extent, without apparently interfering in the least with the process, and that children have been born after such hemorrhages, at full term, strong and healthy. On the other hand, it is well known that some women suffer with very severe pains in the back and loins during pregnancy, and who, upon assuming the erect posture, feel as though the contents of the uterus must escape at once, so great is the sense of weight and bearing down; yet these go safely through utero-gestation, and at the full term are safely delivered of fine well-grown children. Puzos considers that neither pain nor hemorrhage were necessarily followed by expulsion. When, however, pain comes on at regular intervals, with a simultaneous hardness of the uterus and dilatation of the os, accompanied by more or less hemorrhage, the case may be considered one of impending expulsion, and the danger of making a wrong diagnosis will not be great.

7. *Prognosis.* In the foregoing discussion of our subject we have already, in a measure, anticipated the prognosis of abortions, if not in so many words, inferentially at least.

We propose to give the prognosis of each of the varieties of abortion, in the order in which they have been presented.

It has already been intimated that *ovular abortions*, under ordinary circumstances, scarcely amount to indisposition. The symptoms and attending phenomena being but little if any more grave than those of difficult menstruation, and about as easily and promptly recovered from.

The embryonic abortions, on account of a greater degree of dilatation being required to allow of the escape of the embryo, are not so easily affected as the former variety, and the increased size of the uterine vessels causes an excess of hemorrhage; but neither the pain nor hemorrhage amount to much importance. The prog-

nosis of this variety is generally not unfavorable. Perhaps the most serious aspect of the case is a liability to recur at about the same stage in succeeding pregnancies, especially when it occurs in *primipara*. After the uterus has been excited to contraction in the early part of the first pregnancy, it appears to be able to withstand only a given amount of irritation, in subsequent ones, at the same stage, before the uterine motor action becomes excited and the embryo is thrown off. From these early abortions occurring in rapid succession, sometimes to the extent of four or five in a year, the uterus becomes habituated to abnormal contraction, or a morbid irritability of the organ is established, which it is often difficult to overcome, and which if continued, ultimately, through the various sympathetic affections it gives rise to, impairs the general health of the woman, and renders her life miserable, without an abatement of the continuance of the miscarriages, until the ability to conceive is lost in the general wreck of health and vital energy.

Fœtal Abortions. For reasons already given, this variety of abortions is more perilous to the woman than either of the other classes. The hemorrhage at the time may prove very troublesome, and even terminate in death. The delivery of the placenta is often attended with much more difficulty at this stage than at either of the preceding ones, or the one succeeding. It being more perfectly organized, of a larger growth and firmer texture, than at any previous period, a more decided uterine effort is necessary to detach and expel it than is previously required, or than is frequently present; this condition is, almost of necessity, attended with very serious hemorrhage. As the acute inflammatory diseases pertaining to child-bearing, are more frequent in their occurrence after labor, and as the constitutional effects of an abortion at this stage, render the system more liable to such diseases, the after consequences of the miscarriage are often the most disastrous, even more so than from premature delivery at a later period, or after a normal labor of full time. A uniformly favorably prognosis, therefore, is by no means certain.

Premature Delivery. The prognosis of premature delivery, on account of its nearer approach to normal labor, is more favorable than that of fœtal abortion. The principal danger consists in

hemorrhage from a retarded delivery of the placenta, and peritoneal inflammation, subsequent to delivery ; these are not so liable to occur as in the last-mentioned variety, but are more liable than after delivery at full term.

The prognosis of spontaneous abortion, when it is not the result of inflammatory or malignant organic disease, and of slowly consummated accidental abortion, is more favorable, let them occur at any stage, than where it happens suddenly, from accident or emotion.

8. *Treatment of Abortion.* The treatment of abortion presents three distinct and important points for consideration. First, Its prevention ; Second, its management, if prevention fails ; and Third, the delivery of the placenta. The two last divisions may be seriously complicated with hemorrhage, which is included in, and the treatment of which, constitutes a part of the management of the case.

First, the Prevention of Abortion. During the ovular and embryonic stages of pregnancy, abortion is apt to occur from irritation of the excitor nerves of distant parts of the system, as well as those more proximate to the uterus. The irritation of the trifacial nerve, causing toothache, irritation of the mammary nerves caused by lactation, and of the vaginal nerves, as induced by the presence of a pessary, a plug, or coition, etc., are alike equally liable to produce it. In order to prevent the accident accruing from these or any of the other excentric exciting causes, they must be removed, and if this cannot be done, their local effect mitigated as much as possible. In case of the severe tooth-ache of pregnancy, which sometimes threatens the safety of the ovum or embryo, where it is incorrigible to treatment, extraction is far preferable to continued suffering. Anæsthetics may be employed with impunity. Should the cutting of a *dens sapientia*, or the wisdom tooth occur simultaneously with conception, and cause much suffering and nervous disturbance, great relief would be experienced by having the gum divided down to the tooth. The relieved tension of the gum, and the slight hemorrhage attending the operation, usually relieve the pain instantly.

The irritation attending mercurial salivation, must be removed by the means usually employed, in the treatment of that affliction, as

warm astringent washes, and the administration of flour of sulphur in four or five grain doses every hour or two.

As nursing causes an irritation of the mammary nerves, the function of lactation should be discontinued, as soon as conception is known to have occurred. The child should therefore be weaned immediately for the benefit of both it and the mother.

Vaginal Irritation. Where the presence of a pessary in the vagina is attended with leucorrhœa, and pain in the back, or any other symptoms of either ovarian or embryonic abortion, it should be removed at once, and the symptoms of prolapsus, for which it was worn, should be treated by rest in the horizontal position, quietude, etc. In this early stage of pregnancy, there hardly exists a possibility of hemorrhage sufficient to cause any immediate danger; therefore the tampon need not be resorted to, to arrest what bleeding there may be present, threatening an abortion, as its presence in the vagina will tend to irritate the excitor nerves of that organ and of the os uteri, and thus increase the threatened danger. What hemorrhage may exist, may be better and more safely controlled by perfect quietude, and cold applied to the vulva, and heat to the sacrum, and the administration of some anodyne astringent, as opium and acet. of lead, or hyoscyamus and iron alum in combination. Coitus during the first months of gestation, where there is a tendency to abortion, should be avoided, for the same reason.

Any other local pain or irritation, or constitutional derangement, tending to produce abortions, through reflex nervous action, should be promptly relieved. Attempts to quiet uterine disturbance, by means addressed to that organ alone, while the distant cause producing it exists, will ever prove abortive. As well might we expect to relieve headache, arising from a disordered stomach, or an ophthalmia, during the presence of the irritating mote in the eye, by local applications, as to arrest uterine contractions induced by reflex nervous irritation, by means addressed to the uterus alone.

In employing our precautionary or prophylactic measures to prevent abortion, especial reference should be had to what would have been the catamenial climacteric, had pregnancy not been present. In women who suffer from dysmenorrhœa or men-

orrhagia—irritation of the *ovarian nerves*—as evinced by severe, distressing pain in the back, occurring during the early months of pregnancy, at the usual periodical dates, constitutes one of the chief dangers of abortion during this stage. Ovarian irritation during pregnancy, therefore, calls for our particular attention upon the approach of these critical periods, and the same treatment indicated in the menstrual intervals, to prevent suffering at an approaching period in the non-gravid state, is applicable here. Warm hip baths, not exceeding 100° Fahrenheit; warm enemata of the same temperature ; a hot-water bag to the sacrum, followed by an opium or belladonna plaster, and the administration of bromide potass., in about fifteen grain doses, three or four times a day, are amongst our most potent remedies ; but most especially should the avoidance of coitus, or any other vaginal excitant, be observed during these times.

Vesical irritation, occurring during *any stage* of pregnancy, in nervous, sensitive women, or where it is attended with symptoms of abortion, should be promptly relieved. Where it arises from the presence of calculus, which, fortunately, is an extremely rare coincidence with pregnancy, palliative measures only can be employed, as an attempt at its removal would incur a greater risk than its continued presence ; this, therefore, must be deferred to the non-gravid state. Strangury, dysuria, incontinence of urine, etc., must be treated as though pregnancy did not exist.

Rectal irritation, like the vesical, may give rise to abortion, at any stage of gestation. Its means of relief are simple, and of easy application. They consist chiefly in the avoidance or removal of accumulations in the rectum, by the use of mild laxatives and enemata ; if the irritation arises from the presence of ascarides, they too must be removed. Hemorrhoids, which often constitute a source of distressing irritation during pregnancy, sufficient to induce uterine contraction, are to be treated as in the absence of pregnancy. No surgical operations about the rectum or anus are advisable in this condition of the patient. Drastic purgatives must be avoided.

To comprehend the necessity of relieving all irritation of the vagina, bladder and rectum, during pregnancy, it is only required

to recognize them as possessing excitor surfaces and excitor nerves, liable to reflect irritation upon the uterus, through the spinal centre and utero-spinal nerves. Their relative physiological position with the uterus is of much more significance, therefore, than the mere fact of their being neighbors.

Uterine irritation. The uterus has its own excitor nerves, which, acting through the spinal centre, reflect the irritation upon the motor apparatus of the organ, and cause its contraction and the consequent expulsion of its contents; the irritation acting in a manner similar to that of the lungs, which induces coughing, or of the stomach causing vomiting. The uterine excitor nerves may be influenced by diseases of the placenta, membranes, foetus, or of the uterus itself, and more especially, of the os and cervix, which are the most excitable parts. Here we may have to contend with malignant disorders, as cancer, syphilis, gonorrhœa, the various classes of tumors, etc., which may be complicated with pregnancy, and for which, little more can be done than to palliate suffering, and endeavor to arrest the sympathetic currents by the use of morphia, aconite, belladonna, hyoscyamus, bromide of potass., etc. In case of inflammation, ulceration, etc., of the os uteri, we had better risk the proper treatment, such as should be employed in the non-gravid state, than the consequences of a continuance of the disease. Should the patient even escape abortion or premature delivery, a morbid condition of the os might endanger its safety at the time of parturition. Serious lacerations of the structures of the os and cervix not unfrequently result from such lesions, as the head escapes from the uterus. Local depletion, by means of a few leeches to the affected part, careful cauterization once every week or ten days, though themselves uterine irritants, experience has proved to be less likely to cause abortion, than a persistence of the primary irritation uninterrupted. Helonin has a specific relation to the urino-genital organs, and has been most beneficially employed in those affections of the os uteri. The dose is from a half to a grain, given three or four times a day, or oftener if necessary, triturated in sugar or simple syrup.

Desormeaux recognizes two opposite conditions of the uterus, which alike favor too early an expulsion of the foetus: one is excessive rigidity, and sensibility and contractility of the uterine

fibræ; the other is excessive debility or relaxation of the fibræ of the uterus, and especially those of the cervix and os. We have observed these opposite conditions of the uterus in abortions, and marked the facility and comfort with which the process is effected in the latter case, compared with it in the former; but the thought never occurred to us originally, that these conditions may alike be the cause of abortions; this view, however, we fully endorse.

Desormeaux, seconded by Cazeaux, recommends bathing, general bleeding, and a regular course of living, as the best means for moderating this great irritability of the organ, to which may be added, the use of lobelia inflata, dioscorin, and the hot-water bag to the sacrum; and that a tonic and strengthening regimen, aided by the ferruginous preparations, cold baths, and the chalybeate mineral waters; a modern remedy of great power, as a uterine tonic, we have in the helonin; the ice bag to the sacrum, half an hour at a time daily, is here indicated; these will be the most usefully employed in those cases of uterine weakness, where the general debility of the patient may have seemed to exercise some influence over her former abortions.

In versions of the uterus the only means promising any essential benefit is the restoration of the organ to its normal position. As these displacements can only occur while the organ remains in the cavity of the pelvis, the most danger of abortions resulting from the irritation caused by them, is confined mainly to the ovarian and embryonic varieties. Sometimes the effecting of a reposition of the displaced organ, is a more difficult task than might at first be imagined, and occasionally, after several unsuccessful attempts to reduce it, will spontaneously return to its normal position. Dr. Benjamin Wilson, of this city, recently informed us of a case of retroversion, that occurred in the third month of gestation, which came under his own observation, and which resisted his most strenuous efforts at a reduction, for some three days, and then, during his absence, was suddenly and spontaneously restored.

Uterine irritation, arising from a pathological state of the placenta, may excite uterine contractions, and cause the expulsion of the foetus at any stage of pregnancy. This irritation is, however, most generally induced secondarily, through the death of the foetus

in utero. The placenta is the organ through which the foetus derives the oxygen from the atmosphere. It is conveyed to it by the mother's blood, through the medium of the placento-foetal circulation, and from this circumstance the placenta has been regarded as a sort of air-breathing apparatus for the foetus. If it becomes, through detachment from the uterus, morbid deposits, or by the action of disease, incapacitated from supplying the required amount of oxygen, or carrying on the placento-foetal circulation, the death of the foetus from asphyxia becomes the inevitable consequence, and as a foreign body, irritates the utero-excitor nerves; hence abortion or premature delivery. A diagnosis in such cases is extremely difficult. Where the woman is in the habit of miscarrying about the same time, in the latter part of gestation, and who is strong and healthy, and where the foetus dies by asphyxia, there is pretty conclusive evidence that the fault is in the placenta, as the foetus is deprived of a full supply of oxygen. To meet this indication, it is advised to furnish the woman with an increased quantity of this element, hence the inspiration of atmospheric air that has been surcharged with oxygen, and the use of medicines in which it largely abounds, as nitric acid, etc., have been recommended. So that the diminished quantity of blood received by the foetus, may be compensated for by an excess of oxygen. Professor Simpson prescribes chlorate of potash for that purpose; he also recommends the induction of premature labor, during the life of the foetus, with a view of saving it from death.

Where disease is the cause of death in the foetus, and consequently of abortion, successively for several times, in the same individual, as shown by the absence of the signs of asphyxia; and as diagnosis furnishes us with no means of determining the existence of such disease during the life of the foetus, very little can be done towards its preservation, further than maintaining good healthy conditions in the mother. No attempt at treating the foetus in utero, as an independent being, with our present knowledge of diagnosing its diseases, can be of any avail.

Abortions from habit can be prevented with certainty, only as we understand the cause of such habit. It may proceed from local or general morbid conditions. Excessive rigidity or flaccidity of the uterine structures may be the cause of abortion at about

the same time, in several successive pregnancies ; when such is the case the treatment already suggested for these opposite conditions of the uterus, is applicable, especially when the latter is associated with constitutional enæmia and debility. Sometimes those of a scrofulous diathesis are particularly unfortunate in this respect, and the treatment usually resorted to in combatting that disease, is the one most successful in preventing those periodical abortions. The preparations of iodine, with a generous nutritious diet, and moderate exercise in the open air, are amongst the most efficacious means. In addition to whatever treatment may be adopted, care should be taken to avoid all sources of uterine irritation until after the critical period shall have passed.

It occasionally occurs that women will abort about the same time of pregnancy despite of everything that may be done to prevent it; and without the perception of any sufficient cause, either local or general. In such cases successful attempts to prevent the accident have been made, by requiring the woman to keep her bed during the whole term of gestation. Forty weeks' imprisonment is a pretty severe penalty for an unconscious violation of a physical law ; but it is usually cheerfully endured, for the sake of the promised reward to be embraced at the expiration of the term.

Emotional abortion is almost beyond the reach of art or science to prevent. With scalpel and microscope we can penetrate deeply into the hidden recesses of the physical organism, and bring forth many bright gems of physiological knowledge, but in studying the mental constitution they are of no avail. We must abandon the physical plane, and all the appliances for the study of physical science, and ascend higher in the scale of intellectuality than ever mortal has yet advanced, before we can successfully dissect the mind and study its infinitely diversified and complicated structure. Having neither time, inclination, nor space here to indulge in metaphysical speculations, we must be content to treat the subject as best we can with the means we have at hand. To prevent the accident, then, occurring from mental emotions, the patient should be instructed to avoid all circumstances, places and conditions in the least calculated to disturb the mental equanimity. The emotions of the mind are not always under the control of such precautionary measures, despite of every means, to preserve a mental

placidity, that can be employed, sudden outbursts of passion, gushes of grief, and emotions of fright, terror, etc., are liable to occur at any time, and when least expected, but a great deal may be done by avoiding conditions likely to give rise to such disturbances.

When an abortion is threatened from this cause, every effort should be made to quiet the irritation by every soothing influence, and then to arrest its effects upon the nervous system, by inducing a sound and prolonged sleep. That induced by mesmerism is more tranquilizing, and at the same time it exerts a more powerful and permanently sedative effect upon the nerves, than that produced by any other means. And persons of fine nervous sensibility, who are most susceptible to disturbances of the mental equilibrium, are generally those who can more readily be brought under mesmeric influence.

When should our efforts to prevent abortion become relaxed? This is a question of no trifling importance. It has already been intimated that pain or hemorrhage, singly or combined, are not sufficient to render the case hopeless. Important and painful surgical operations, extensive accidental injuries, and terrific mental shocks, have often occurred to women during pregnancy, without fatally interfering with gestation; and pain and hemorrhage have existed to a very great extent, under the same circumstances, and pregnancy progressed to its natural termination. These facts should encourage us to persevere even against hope, to save the ovum; and not until unmistakable evidences of actually progressing abortion, as regular contractions of the uterus, dilatation of the os uteri, and a separation of the placenta, warn us of the approaching expulsion of the foetus, and admonish us that further exertions to arrest the progress of expulsion are useless.

The viburnum prunifolium (*black haw*) is represented to be an almost infallible preventive of abortions, whether occurring from habit, accident, mental agitation, criminal drugging, or from any other cause. It is said to counteract the effects of any of the drugs used for that purpose. It not only invariably arrests the progress of abortion, when once commenced, and attended with pain, hemorrhage, and even in one instance reported, a discharge of the liquor amnii, but it is equally serviceable as a prophylactic,

where the accident is threatened, or where it has habitually occurred previously.

It was introduced to the notice of the profession by Dr. D. L. Phares, of Netonia, Miss., through the *Atlanta Medical and Surgical Journal*. He says of it: "It has certainly prevented abortion in every case in which I have ordered it for that purpose. Negatively, miscarriage has never taken place, so far as I am informed, in any case in which this medicine was used as a preventive." The doctor relates several cases where it proved successful, some of which were attended with circumstances of great aggravation. We witnessed the effects of the article in the first case in which it was ever known to be exhibited in this city. It was prescribed by Dr. I. Lukens to his own wife, with very marked advantage; it arrested the hemorrhage almost instantly, and relieved the pains in a very short time.

It is used in the bark, 3ss. to 3i.; in powder, infusion, fʒss; or saturated tincture, fʒi., two or three times a day. It is certainly worthy of further trial.

The Management of Abortion. In undertaking the management of a case of abortion but one object can influence the action of the accoucheur, and that is to conduct the patient safely through her premature travail. Should all hopes and prospects of arresting the process, be dissipated by the regularly advancing symptoms, and signs of its steady progress, notwithstanding the prompt and earnest efforts made to that end, the whole duty of the medical attendant will be comprised in two points, viz.: first, to control the hemorrhage, and second, to facilitate the expulsion of the contents of the uterus. The accomplishment of these two objects so often requires the employment of the same means that it would seem almost useless to award to them a separate consideration. It, nevertheless, not unfrequently occurs that the hemorrhage is so terrific as to threaten the life of the woman, while the condition of the uterus remains such as to admit of no, or very little, assistance being afforded it, either by the way of dilating the os, or promoting its expulsive ability. Under such circumstances, the control of the hemorrhage alone becomes a duty of the first magnitude.

Uterine hemorrhage, when it occurs during pregnancy, in the

absence of any malignant disease, can proceed but from one source, and be induced by but one circumstance: it comes from the site of the placenta, and is induced by its detachment from the uterine walls to which it is adherent in the normal state, resulting either from accident or congestion. Let this fact be borne in mind by the student, and it will relieve him of much embarrassment in practice, in regard to the cause and source of such hemorrhages. Its violence depends upon two circumstances, viz.: the extent of the detachment and the period of pregnancy at which it occurs; and its duration depends upon the state of dilatation of the os uteri. Where the detachment is great and pregnancy far advanced, and the os undilated, the hemorrhage will be copious and the duration protracted; on the contrary where the detachment is trifling, though pregnancy be far advanced, the hemorrhage will be comparatively slight, and if the os uteri be dilated or soft and yielding, and the pains regular and efficient, the contents of the uterus will be soon expelled, and the hemorrhage terminated. Again, if the separation be complete and the pregnancy not far advanced, the hemorrhage will not be excessive, because the uterine vessels, at this stage, are too small to admit of the passage of a great quantity of blood through them.

If the hemorrhage be severe, and the os uteri undilated, and the contractions inefficient, the indication is to arrest it. This may be attempted, 1, by enjoining perfect quietude in the horizontal position, with cloths wet with cold vinegar and water, kept constantly to the hypogastrium and vulva, with a jug of hot water to the sacrum or a gum elastic hot water spine bag. 2. With a view of producing a sedative and astringent effect upon the uterine vessels, and at the same time promoting uterine contractions, the following prescription has been found to act with marvelous efficiency.

R. Ol. Erigeron Canadensis	3 <i>ii.</i>
Alcohol	3 <i>i.</i>
Fl. Ext. Secal. Com.	} 3 <i>ii.</i>
Vin. Secal. Com.	

ʒ. Take a teaspoonful every half hour, hour or two hours, according to the urgency of the case.

The secale cornutum, in powder, in doses of from five to ten grains every fifteen or twenty minutes is often given alone, with a

view of arresting the hemorrhage by causing a contraction of the uterine fibres, and thus compressing the uterine vessels.

Plumb. acet. tanic acid, iron alum, per. sulph. of iron, etc., are employed as astringents in uterine hemorrhages of pregnancy, complicating abortions.

Should these means all fail, and the hemorrhage continue unabated, the tampon must be resorted to, nor should its use be too long delayed; it should consist of a piece of fine sponge of appropriate size, and be firmly compressed, and placed up against the os uteri. While this is generally efficient in causing coagulation of the blood, it is much more comfortable to the patient than unnecessary packing the vagina full of linen rags as is the usual practice of some practitioners. These become painful and cannot be borne sufficiently long. The sponge absorbs the blood, which immediately begins to coagulate, and the os uteri very soon becomes plugged up by a clot, which effectually stops the hemorrhage. The sponge can be borne in the vagina sufficiently long without causing any pain or inconvenience, and can be readily removed when required, to ascertain the state of the os and the progress of the case. If fainting be present, proper restoratives and stimulants will be required. After the hemorrhage shall have been restrained, and the immediate danger of the case averted, the next indication is to secure the expulsion of the ovum as speedily as may be compatible with safety. To effect this, the uterine contractions must be promoted, for it is through the contractions of the fundus and body, that the cervix and os are dilated sufficiently to allow the contained body to pass and the contents to be expelled.

Different practitioners have their favorite means of accomplishing this end. Some relying upon one therapeutic agent and some another. The ergot of rye (*secale cornutum*) has long been extensively employed as an excitant of uterine contraction. When used to *induce* such action, disappointment has generally followed its employment; but when resorted to, to promote contractions, already induced, but which are weak, irregular, and hence inefficient, the greatest certainty and promptness attend its use. Given in the powder in doses of from five to ten grains, every fifteen or twenty minutes, mixed in a little warm sugar and water, it seldom fails to accomplish all that is required of it. A change in the

character of the pains will be observed by the time two or three doses shall have been taken, when the medicine must be administered less frequently, and its effects upon the uterus carefully watched. By the injudicious use of the article, much unnecessary suffering may be induced; judgment, therefore is required in determining the quantity to be given at a dose, and the frequency with which it should be repeated.

Some very intelligent and excellent practitioners prefer the caulophyllin, the concentrated preparation of the *caulophyllum thalictroides*, or blue cohosh, to the ergot; its action upon the uterus is alleged to be equally prompt, but more mild and gradual, and not liable to produce such violent contractions if administered in over quantities. It is usually given in doses of one half or one grain triturated fine, or ten grains of white sugar, every one or two hours, or perhaps oftener, if the urgency of the case require it. The fluid extract and essential tincture are also used in doses of from five to ten drops repeated at like intervals.

The tincture of *gossypium herbaceum*, or (cotton plant), in doses of a small teaspoonful every hour or two, is employed by some for the same purpose.

Electro-galvanism applied by means of the hand, rubbed over the abdomen, is said to act promptly in exciting uterine contractions, where the expulsive action of the organ is tardy and inefficient.

In cases of ovular or embryonic, and in the earlier stages of foetal abortions, the best practice is not to disturb the integrity of the ovum by rupturing the membranes, if it can be avoided, but allow it to pass whole if possible, while the membranes remain entire and the embryo and liquor amnii are contained within them; the body to be acted upon by the uterus is larger and is capable of receiving the full amount of pressure, and hence is more readily expelled than if it were reduced in size and capable of receiving but a moiety of the pressure supplied by the contracting uterus. And moreover, the retained secundines, after the escape of the embryo and liquor amnii, are very apt to cause hemorrhage, which is difficult to control while the uterus remains unempted.

When the abortion occurs after the fifth month of pregnancy, and the os uteri is fully dilated, or the os and cervix soft and yielding, the contractions regular and efficient, and the mem-

branes be found protruding through the os uteri, it is recommended by some authors to rupture them and allow the liquor amnii to escape, which will frequently be followed rapidly by the fœtus, and, in due time, by the placenta, with membranes attached. This recommendation, however, is opposed by other accoucheurs of equal eminence, who insist that the membranes should be allowed to remain whole, until spontaneously ruptured by the force of the contracting uterus. Sometimes, the artificial rupturing of the membranes seems to retard the process of expulsion, while, at other times, it evidently hastens it; and it is difficult to determine what effect it will have upon the action of the uterus beforehand. Viewed theoretically, the conclusion that such interference must prove beneficial, would be irresistible. It is presupposed that by evacuating the waters, the uterine walls come in contact with the fœtus, which is, at this time, of considerable size, and being a more resisting substance than the membranes, and waters surrounding it, it imparts a more decided irritation to the excito-motor nerves of the uterus, and hence, increases its contractions. But such is not always found to be the case in practice. As this subject will again be brought under consideration, in a subsequent part of the work, it is here dismissed for the present.

It frequently occurs, when the course of gestation is interrupted, either by some faulty condition of the mother or by an accident to the fœtus, the shock communicated to the system is so great as to produce a rigor or rigors of greater or less violence, followed by a proportionally well marked fever and severe headache, thirst, nausea, vomiting, etc. When the incursion of an abortion is announced by the foregoing symptoms, it will be of but little avail to attempt to arrest its progress, as the whole nervous system appears to be involved, every part of which becomes exciters to the motor nerves of the uterus, and pain, and more or less hemorrhage, follow almost immediately the subsidence of the fever. The only treatment that can be of any advantage under these circumstances, is quietude and some warm drinks during the chill, and a mild refrigerating course during the fever, and a dose of compound cathartic pills or some other mild purgative.

Where the symptoms of abortion are well marked, with pains regularly alternating with intervals of ease, the os uteri relaxed

or open, the vaginal discharges moderate, no headache, fever, nor sounness of the hypogastrium, nor any other symptoms of local congestion or urgent constitutional disturbance, and when all the preventive measures have been vigorously employed without avail, there is nothing to be done but to wait and watch the progress of the case ; the less it is interfered with, the better.

1. Delivery of the Placenta and controlling the attendant Hemorrhage. One marked difference is observed in regard to hemorrhage, between natural labor and abortions. In the former case, it is most serious generally after the delivery of the placenta, while in the latter, it is the most troublesome during the course of expulsion of, often, both the foetus and placenta. This supplemental stage of abortion is, therefore, often as seriously complicated with hemorrhage as any other part of the process, and necessarily attended with greater danger, because the blood lost during the expulsion of the foetus, which is frequently a large quantity, renders the patient less able to bear the bleeding incident to the removal of the placenta ; consequently, the longer the uterus remains unemptied of all its contents, if the hemorrhage continue, the more imminent the danger.

When the loss of blood, during the expulsion of the foetus, has been great, and the patient has become reduced in strength, and manifests symptoms of faintness, as nausea, vomiting, paleness, etc., and the pulse be small, quick and tremulous, and the bleeding not abated, or even if the former symptoms are less urgent, and the latter one be persistent, all efforts at removing the placenta must be suspended, for the present, and the attention of the accoucheur be directed to arresting the hemorrhage, unless, upon an examination, the placenta be found occupying the os uteri, and can be readily removed by hooking the finger around it and withdrawing it, which, by all means, should be done, as the most effectual means of stopping the flow. On the contrary, when the secundines cannot be reached by the finger, on account of their high position in the cavity of the uterus and the imperfect dilatation of the os and cervix uteri, no attempt must be made at their removal, but the efforts must be to staunch the flow by the means already suggested, and especially by the introduction of the plug, which, if properly adjusted, always stops the bleeding.

In studying the delivery of the placenta in abortions, it is no less important to bear in mind the periods of pregnancy at which the accident occurs, than it is in reference to the escape of the embryo or foetus. In case of the ovular abortion, there is but little interference necessary, the structures being so imperfectly organized, they escape with the sanguineous discharges almost in a state of solution, without much difficulty, when the ovum does not pass entire; all that is required is to enjoin quietude in the horizontal position, and pay attention to restraining the hemorrhage if it should become excessive.

In embryonic abortions, where the product of conception does not pass entire, but where the embryo escapes and leaves the seundines behind, a little more difficulty may be encountered in effecting their expulsion; but the pain occasioned is not very severe, nor the hemorrhage, generally, very threatening, and but little can be done, nor is there but little needed, further than what has just been directed in the ovular variety.

In foetal abortions, phenomena of a more serious and threatening character may be present. The placental mass has acquired a greater size, is denser in its texture, more firmly adhering to the uterine walls, and supplied with a greater amount of blood, through larger vessels, than at any former period; hence, a greater degree of dilatation, and a more complete contraction of the uterine fibres are necessary for its expulsion; and the uterus, from its imperfect expansion, is not endowed with a degree of contractility sufficient to admit of a speedy or perfect dilatation of the os or contraction of the fibres of the uterus. These opposing conditions, therefore, favor a tardy delivery of the placenta, and a free discharge of blood during its retention in the uterine cavity. When these two conditions, viz.: retention and hemorrhage are present, interference becomes imperative. As the most threatening danger, at the time, consists in the hemorrhage, it must be first to claim attention, and be combatted, as already directed, in case of expulsion of the foetus. The same indications being present, the same treatment is demanded. If the ergot, cohosh, and other means employed to control the hemorrhage, fail to promote contractions sufficient to expel the placenta, its removal must be attempted by artificial means.

If, upon examination, the placenta be found protruding through the dilated and ramollescent os. and cervix uteri, a finger or two may be passed up between the mass and the inner surface of the uterus, and by a succession of short tractive efforts work it down, so that it can be grasped and removed. The umbilical cord, at this stage of development, from its tenuity and weakness is of but little use in delivering the placenta, further than serving as a guide to direct the exploring hand to its location, the least traction upon it causes its separation. If the placenta cannot be removed in this way, but is too high to be reached by the finger, the placental forceps or crochet must be resorted to. The main objection to a few hours' delay in delivering the placenta, in the absence of hemorrhage, is the liability of the os uteri to contract, and retain it within the uterus.

Where the separation is not complete, and the placenta retained in consequence, and cannot be removed by the instruments without great difficulty, resource must be had to ergot in liberal doses, and if hemorrhage be present, the tampon must be employed during its continuance.

After the delivery of the placenta, the pain, hemorrhage and anxiety cease, and the patient's main discomfort is that which results from previous mental excitement and loss of blood.

Where the ovum is destroyed in the early weeks of gestation, and the secundines are not expelled with the minute embryo, or even where it is retained also, if the ovum be mutilated, the mass may consolidate into a firm fleshy substance, constituting the *solid mole*. The vesicular mole, or hydatids is said to be derived from the same cause, (*M. Velpeau.*)

There are instances recorded of the placenta being disposed of in another way than expulsion, decomposition, or degeneration into moles, viz.: absorption; and this has been observed to occur after delivery at term; but such a termination is generally confined to abortions, and that in the early stage of pregnancy, (*Naegele, Osiander, etc.*)

The phenomena attending the expulsion of the placenta at a premature birth bear so strong a similitude to those of labor at term, and the means employed to assist the delivery of either, when required, are so nearly identical, we shall not prolong this article by entering into its details here, but leave it until we come to consider the delivery of the placenta in a natural labor.

PART NINTH.

OF LABOR.

LABOR is the term employed to designate the process by which a child is born, by which a human being is transferred from intra to extra-uterine life, from a most dependent to an independent state of existence. Labor terminates one state of being and inaugurates another. The myriads of the genus homo who populate the earth, from the imperial monarch to the suppliant mendicant; from she who revels in regal splendor to the denuded daughter of tropical heathendom; they of every grade and condition, high and low, owe their present existence to that marvelous process called labor. Man with his attributes of divinity, his godlike endowments, his capability to grapple successfully with, and demolish the rough asperities of nature around him, and beautify the earth, and render it attractive by the magic of his genius; to encompass sea and land with an iron girdle, and make the lightning subservient to his will and pleasure; to annihilate time and distance; to plough the oceans, and survey the heavens; to seize the artillery of Juno, render it nugatory, and lay it harmless at his feet. Man destined for immortal life, to an existence through all the everlasting rounds of time, and endless cycles of eternity, comes into earthly existence only through the same veritable process of labor. It matters not what distinction in rank or station, wealth or wisdom may exist in the world, one fact stands out undisguised, and that is, in regard to the manner of birth, there is a universal equality; all come into earthly existence by the grand old function of LABOR.

The function of labor consists in the simultaneous dilatation of the os, and the contraction of the fibres of the uterus, and the spontaneous or artificial expulsion of the foetus and its appendages, from its cavity, at, or about the fortieth week of pregnancy, or the tenth catamenial date after conception, by the natural passages.

Various other appellations have been used by different authors, to designate this function: as *accouchement*, by the French, derived from *ad* and *cubare*, signifying, placed near to; parturition, from the Latin *partus*, *partio*, *parturigo*; the delivery of the foetus and its appendages; *puerperium*, child-birth, etc., but all the English and American writers have adhered to the good old English term "Labor" as being the most comprehensive and expressive of its phenomenal characteristics.

Labor has been defined as a truly mechanical operation and susceptible of geometrical demonstration. (*Levrit.*)

Labor is a purely mechanical operation, subject to the laws of gravitation and motion. (*Baudelocque.*)

Labor is nothing more than the passing of the child and its appendages from the womb. (*Maygrier.*)

Every experienced accoucheur has observed that labor is as much a physiological process as any other function of the body; while at the same time it derives important assistance from the laws of mechanics. It is therefore a combined operation of physiology and mechanics. The necessary dilatation and contraction are purely physiological, while the force applied to the foetus and its advance movement in response to it, are as purely mechanical.

Various distinctive titles have been applied to labor, indicative of the time at which it occurs, in relation to term. Thus *premature* or *precocious* labor, is that which takes place between the seventh month and term. *Legitimate*, *timely* or *normal* labor is that which takes place at or about the normal termination of gestation, or at term. This does not always occur on the precise day that the forty weeks, or nine calendar months, or ten lunar months expire; there is often a divergence from this of several days or even weeks either before or after the terminal day of gestation. *Tardy* or *retarded* labor is when it does not transpire until after the allotted term, say at ten calendar months, or more from the date of conception. The term "tardy," as used here, is evi-

dently a misnomer, though it is retained by most if not all the authors who have treated on this branch of the subject. The term tardy is applicable rather to a slow, lingering labor than to one that does not take place until after the usual time for its occurrence has passed. *Delayed* or *deferred* labor would be much more expressive of the meaning the word "tardy" is intended to convey, and much less likely to be confounded with a slow or lingering labor.

Premature or Precocious Labor. As premature or precocious labor has been considered, in regard to its causes, symptoms, diagnosis, prognosis, and treatment, in the foregoing article, as fully as is necessary, in view of its analogy to normal labor, the study of which will necessarily include what has not been already presented in connection herewith, we shall dismiss the subject without further remark.

CHAPTER I.

DELAYED OR DEFERRED LABOR.

CAZEAUX, in his inimitable work on Midwifery, has given a very instructive but concise article, under the head of "RETARDED LABOR," which we copy entire, as it embraces all we wish to say on the subject:

"As an ordinary rule, the pregnancy terminates about the two hundred and seventieth day* after the conception has taken place. However, the accouchment often occurs at an earlier period than this, and, on the other hand, it may not appear until some time in the course of the tenth month, or even until after this period has passed, although this latter variety is much more unusual. In making this statement, we decide a question in advance, that gave rise to some very sharp and animated discussions during the last

*Forty weeks, at seven days each, make two hundred and eighty days, the time of human gestation.

century, and still more recently, the tribunals of England have summoned to their bar the most celebrated physicians of Great Britain, and have listened to numerous and protracted pleadings for and against the legitimacy of retarded labors.

"But this question no longer presents to the medical jurist the same difficulty that it did in the past century, for the French law has now declared every child to be legitimate that is born after the one hundred and eightieth, or before the three hundredth day of marriage; and, if it were possible, in the eye of the law, for a pregnancy to continue more than ten months, it further adds, that the legitimacy of a child born three hundred days after the dissolution of the marriage contract *may* be contested.

"Although a legal decision has thus deprived the question of retarded labors of its greatest interest, yet we, as practitioners, may be permitted to recall briefly the principal reasons that militate in their favor.

"At first, it was very natural to study the process in those animals which approach the nearest to man, in order to judge of the possibility of a retarded birth in the human species.

"Among the numerous observations made on this subject, those submitted by M. Tessier, in 1819, to the Academy of Sciences, at Paris, of which the following is a summary, are probably the most exact, namely: out of one hundred and sixty cows, fourteen calved from the two hundred and forty-first to the two hundred and sixty-sixth day; three, on the two hundred and seventieth; fifty, from the two hundred and seventieth to the two hundred and eightieth; sixty-eight, from the two hundred and eightieth to the two hundred and ninetieth; twenty, to the three hundredth; and five on the three hundred and eighth day, which gives a difference of sixty-seven days between the births, if we compare the shortest with the longest period. And of one hundred and two mares:

3 foaled on the 311th day.			
1	"	"	314th "
1	"	"	325th "
1	"	"	326th "
2	"	"	330th "
47	"	from the 340th to the 350th day.	
25	"	"	350th " 360th "
21	"	"	360th " 377th "
1	"	on the 394th day.	

Making a difference of eighty-three days between the two extremes. Nine months and ten days being the average term for cows, and eleven months and ten days for mares.

"These well-ascertained variations in the terms of gestation in animals certainly afford a strong presumption of their existence in the human species also; for if cows and mares, whose gestation is not troubled with those various causes that may lead to changes in a woman, may thus defer, for some time, the ordinary period, how much more would human females, who are subject to so many diseases, and upon whom the moral and social relations exert so powerful an influence—how much more likely would they be to offer numerous varieties in the duration of their pregnancies?

"But all this was a mere probability; and the question would still remain undetermined, if careful observations directly made, and well made, on the human species, had not removed all doubts on that point; for several cases bearing on this subject now enrich our science, where a single well-established instance would suffice to produce conviction. Take, for example, the following case, reported by Desormeaux: A lady, the mother of three children, became affected in her mind; for which the resources of therapeutics were tried in vain. As her physician thought that another pregnancy might possibly reestablish her intellectual faculties, the husband consented to note on a register the time of each sexual union, which only took place every three months, lest a previous conception (then uncertain) should be disturbed; and this lady who was closely watched by her domestics, and was besides endowed with the most rigid principles of religion and morality, was not delivered before the expiration of nine months and a half.

"Merriman furnishes a summary of one hundred and fifty gestations, in each of which he has noted the precise day of the menses' last appearance. From this table it appears that:

5 women were delivered in the 37th week, i. e., from 252 to 259 days.									
16	"	"	"	"	38th	"	"	262 to 266	"
21	"	"	"	"	39th	"	"	267 to 273	"
46	"	"	"	"	40th	"	"	274 to 280	"
28	"	"	"	"	41st	"	"	281 to 287	"
18	"	"	"	"	42nd	"	"	288 to 294	"
11	"	"	"	"	43rd	"	"	295 to 301	"
5	"	"	"	"	44th	"	"	303 to 306	" *

* For still greater deviations from the allotted term, see tables I., II., III., page, 208-9.

"From the foregoing statement we learn the great variety in the length of gestation. There is, in fact, a difference of fifty-six days between the two extremities ; and, supposing that each woman became enciente five days after the cessation of her courses, five of them, at least, would overrun the average term of nine months by ten or twelve days."

CHAPTER II.

NATURAL OR UNASSISTED LABOR AT TERM.

AFTER the foetus has arrived at that degree of maturity of which it is capable, during intra-uterine life, the process of gestation is complete, and the contents of the uterus are expelled by the spontaneous action of the organ ; this is what is denominated a "timely labor," or "labor at term."

In studying labor, when left to the uninterrupted powers of nature, two very distinct phenomena are observed—one peculiarly physiological in its character and in relation to the uterus ; the other strikingly mechanical and in relation to the foetus. Before the foetus can make any advance towards an exit from the cavity of the uterus, it is necessary that the os uteri must become sufficiently dilated or opened to allow it to pass. This act of dilatation, which will be shown in the sequel to be entirely physiological, some authors contend, is exclusively mechanical, and induced by the mechanical pressure of the waters within the membranes, and the presenting part of the foetus, upon the os, forcing it open. Now it is well known that no power can be applied to the os uteri, externally, with a view of forcing it open, without incurring a risk of lacerating it, just in proportion to the amount of force applied, and the liability to tear the structures is enhanced by the fact, that force, so applied, excites the excito-motor nerves to increased actions, and an increased rigidity of the part is the result, which, if attempted to be overcome by force, must be at the expense of the

continuity of structure. Hence the obstetrical maxim, "that no circumstance will justify a forcible entry of the uterus." If this is the effect of the *external* application of force; what is there to prevent a like result from its application internally? So far from there being an opposite physiological condition of the two surfaces of the os uteri, it is the practice of all well-educated accoucheurs, in cases of lingering labor, rendered so from inefficient uterine action, where the os uteri is in a proper condition, or dilated, to excite contraction by making pressure upon and titillating the inner surface of the os; this manœuvre will almost instantly be attended with a contraction of the part, which can be readily perceived by the finger employed, and which is immediately communicated to the fundus and body, and is continued so long as the pressure and titillation is made to last; showing that pressure and friction there, by the distended membranes and presenting part of the foetus, so far from forcing open the os, mechanically, they tend rather to increase its tightness, if they act upon it at all. We cannot at present pursue the investigation of this point further, without anticipating what is designed to be said upon it in another connection.

When the os uteri is fully dilated or dilatable the foetus is propelled through it, the vaginal canal, the straits of the pelvis, the external organs, and appears in the outer world, when separated, by the division of the umbilical cord, as a distinct individual, depending upon external agencies for an independent state of existence. This transition from intra to extra-uterine life is effected by the direct application of mechanical force to the foetal body. This force is supplied by the contraction of the uterine fibres, the induction of which is purely physiological. This process affords a sublime instance of a most powerful mechanical force, induced by the simple physiological action of the excito-motor nerves of the uterus, and the result is the crowning achievement of nature's grandest achievement.

Here is presented a question of surpassing interest to every student of nature. Why is it that the uterus takes on this physiologico-mechanical action at this particular time—at just forty weeks, or two hundred and eighty days after conception—as a general law? This question involves the consideration of:

SECTION I.—THE CAUSE OF LABOR.

Perhaps there is no subject connected with human physiology, that has been enveloped in greater obscurity, or that has so long defied the inquiries of the learned, as the cause of labor. It was thought by Hippocrates, and the ancients generally, that the foetus, at term, was moved by some intuitive perception, that the period for its liberation had arrived, and that by a series of exertions it was enabled to effect its escape from its uterine confinement, independent of any agency on the part of the uterus itself. This absurd idea had its origin in a comparison instituted between the foetus in utero and the young bird within the shell of the egg. As it was seen that the chick worked its way out of the shell by its own exclusive efforts, so it was supposed the foetus liberated itself.

There were objections, however, arraigned against this view of the matter, that stayed the universal acceptance of it, even with the ancients, and entirely excluded it from amongst the theories of the moderns. The frequent expulsion of a dead, and partially decomposed foetus, presented an insurmountable objection to this hypothesis, and forced inquirers to the conclusion, that the uterus must act a very important part, at least, in the grand process of parturition; though it was long maintained that the foetus could not come forth without exerting itself to a greater or less extent. Notwithstanding the repeated occurrence of the birth of dead foetuses, and at different periods of gestation, and the impossibility of living ones at three, four, six or even nine months, possessing strength sufficient to accomplish the feats, that the hand of a strong man is incapable of doing, unassisted by physiological action, viz.: forcing open the os uteri and extracting the foetus; so great was the influence of the ancient absurdity upon the professional mind, that centuries were required to wipe it out, and establish in its place the great physiological truth that the parturient function is performed exclusively by the powers of the uterus, and that the foetus is wholly neutral, a mere passive agent in the transaction.

In view of the universally admitted fact, that labors, resulting in the birth of dead children are, generally, more protracted and difficult than those of living ones, some minds, even at the present day, are loathe to abandon entirely the ancient fallacy of foetal

aid, but attribute the comparative ease and comfort of the latter labors to the direct agency of the living foetus. While the fact of such difference, in regard to these labors exist, there is no warrant in attributing it to any movements on the part of the living foetus; for let it be as active as it may, before labor commences, after this event, it is usually as quiescent as death during the whole of the process; indeed, so perfect is its quietude during the progress of the labor, however protracted, that the mother often expresses her anxiety in regard to the safety of its life, not the least movement being felt for many hours, yet when born it proves to be healthy and strong. An explanation for the difference in question must be sought in the uterus itself. Upon the death of the foetus, the stimulus it derives from the placento-uterine circulation is withdrawn, necessarily, and a state of partial inertia, or debility of the uterine fibres, is the legitimate result during this state of the uterine fibres; the excito-motor nerves are excited by the presence of the foreign body, and uterine contractions result, as a consequence, which, from the weakened state of the fibres, must be very imperfect; hence, the duration and difficulty of the labor is derived from the imperfection of the uterine contractions, and not from any defect in the agency alleged to be performed by the foetus; and, moreover, the lifeless body of a foetus in utero is exceedingly flaccid, and yields more readily to pressure in every direction than one endowed with vitality, and the consequent resistance of its vitalized tissues, which refuse to yield, but is propelled bodily in the direction of the greatest pressure, which is towards the natural outlet; hence, a living body is expelled more speedily and easily from the uterus than a dead one, all other things being equal.

The occasional escape of the foetus, after the death of the woman, when the uterus is supposed to be reposing in its eternal quietus, has been claimed by the advocates of the ancient hypothesis as irrefragable proof of its validity, presuming the foetus could effect its exit in no other way than by its own inherent powers. Unfortunately for the position, the most cogent argument in its support is lost in the fact that, in all these instances, the foetuses have been born dead. Of this, there can be no question in such cases as the following: Velpeau mentions the circumstance of a

woman "named Homer, who gave birth to a dead child thirty-four hours after she ceased to exist." And Cazeaux relates a case, reported by Hermann, of a young woman who died in her tenth month, and on the third day after was spontaneously delivered of a pair of dead twins, inclosed by the intact membranes. The children showed no signs of putrefaction, the placenta alone presenting marks of a commencing change. There can be no question of the death of the foetus, so long after the departure of the mother; we have no record of the foetus surviving the death of the mother even one hour.

In view of the numerous well authenticated cases, furnished by the records of physiology, of the extraordinary manifestations of post-mortem muscular powers, these instances, and similar ones, of post-mortem births, furnish irresistible proof of the exclusiveness of the uterine effort, in effecting the expulsion of the foetus, and the utter insignificance and uselessness of its individual movements, even should it make any.

Velpeau and Cazeaux both favor the idea that the expulsion, in the two instances just cited, might have been produced by the pressure of large quantities of gas rapidly accumulated in the abdomen. This explanation is considered rather gassy, especially as they have not favored us with the information that there was any such accumulation of gas present.

Authors have divided the causes of labor into two classes, and called them by various names, as proximate and remote, occasional or determining, and efficient or immediate, etc. The two names that have received the greatest favor, and have been the most commonly employed, are the *efficient* and *determining* causes.

Velpeau treats the first under three subdivisions: 1. Efficient causes, which he defines, of those which *effect*, or, properly speaking, *constitute* labor; and he says "they have, by turns, been attributed to the foetus, the womb, the abdominal muscles, the diaphragm, and, sometimes, to all those parts together. 2. *Essential efficient cause*, in which he embraces, or, rather, describes the phenomena observed in the uterus during actual labor, as attenuation of contractions and relaxation, bearing down, etc. 3. *Accessory efficient cause*. This includes the action of the diaphragm, abdominal muscles, the contraction of the longitudinal fibres, to

give proper direction to the descending body, the complicity of the respiratory apparatus, the power of volition in promoting or retarding the process, etc., in detailing which, he gives a graphic description of the final struggles of a natural labor at term.

Determining cause. After reviewing, at length, some of the most popular hypotheses relative to the causes that determine the uterus to take on the expulsive efforts at the close of gestation, and especially that supported by Levret, Baudelocque and Desormeaux, viz.: that from the expansion of the uterus and the distended state of the longitudinal fibres, which are softer and more extensible, "and yield more easily than those of the neck, which are circular, denser, more compact, and situated transversely; between them is established a kind of balancing or contest, which results in the induction of labor," and giving, no doubt, a very self-satisfactory rationale of the process, he observes: "According to this view of the circumstance, I should define the determining cause of labor to be, the *tendency* of the fibres of the body of the uterus to contract; a tendency or effort which produces no real and sensible effect, until from the moment when the cervix ceases to furnish any further materials to the enlargement of the womb."

He finally closes his article of ten pages, on the causes of labor, in the following words: "Let us, then, frankly confess that the deeper we search into the question of the determining causes of labor, the greater will be the number of objections against the explanations that have been given; but do we any better know the determining causes of the contractions of the heart, and the infinity of other actions which, like it, must be admitted as facts?"

Cazeaux discusses the *efficient and determining* causes, and after commenting at some length on the different views noticed by Velpeau and others, and presenting those of similar character, proposed more recently by John Power and taught by Duboise, closes his review of the several theories in the following desponding words: "No one of them, therefore, is entirely satisfactory; and it is certainly the part of wisdom to say with Avicenna, that '*at the appointed time the labor will take place, by the grace of God.*'"

The student is here presented with the veriest synopsis of the most prominent theories, held and defended by the various writers who have treated upon the cause of labor, and though brief, it em-

brates the most important points that have been advanced for *our* instruction and edification. In carrying forward those views, and offering them for the perusal of the student of the present day, it is not so much with the aim of furnishing means of instruction and edification to *him*, as it is to link the "dead past" with the living present, that he may be able to institute a comparison between the fallacies of the one and the philosophy of the other. The philosophical mind of the student, after reading the foregoing, will pause to reflect; he will then turn back and re-read the brief passages cited, and not yet satisfied, will next lay aside his book, and conclude the quotations are too short to contain the whole of the author's ideas, and go in search of the works quoted; he reads the articles, first from one book, and then from the other; his mind is not yet satisfied, and he reads the articles again, and finally comes to the conclusion, that he is too dull of comprehension to "see the point," to discover in all that he has read, a single comprehensible idea of the cause why labor should commence just at the time it usually does. We would say, young friend, you need not look for "the point," for it is not there. The cause, that you are in search of, has failed to be presented.

The difficulty is, the different authors who have essayed to ventilate the subject, have been content to deal with effects, rather than search in the proper direction for the real cause. As has been seen, Velpeau gives up the search in despair. And Cazeaux, after exhausting the resources of his fertile genius, in the vain search for the true cause of labor, wanders back through the lapse of nine centuries, and finds consolation in the pious exclamation of the Arabian philosopher, which harmonizes with the candid admission of Dr. Carpenter, that "we know nothing" of the reason why the period of parturition should be just forty weeks after conception. And all intermediate authors have failed to effect a solution of the problem.

In 1842, Dr. Tyler Smith raised the veil, and permitted the light of science, for the first time, to illumine this mystery, that had, through all the past ages, been wrapped in the most profound darkness. This original genius, while then studying the more obvious reflex actions of parturition, was met by a want of the cause of the first contractions of the uterus, which arose before

him like a barrier, beyond which it seemed impossible for him to pass. He began the surmounting of the obstacle, by steadily considering the first motor phenomena of labor, viz.: the subsidence of the uterine tumor before the actual pains of labor commence, endeavoring to comprehend the nature of this equable contraction, and why the uterus should acquire the special tendency to contract at this time in preference to any other. At first, he was at a loss to see a sufficient excitor cause, and was thrown back upon the old, time-worn path, that led to the supposition that the contraction must depend upon the irritability of the mucous tissue of the uterus itself, and that this irritability was excited by the foetus, after its full development as a foreign body; thus confining himself within the sphere of the researches of his predecessors, that did not extend beyond the uterus and foetus, he soon found the insufficiency of such an explanation, and, from analogy, was impelled to look beyond these for some special excitor cause, which should be adequate to set up the various reflex and other motor actions of parturition. One obstetrical fact presented itself to his mental vision, that went far to impair his faith in the soundness of the old theories, and that was, that uterine contractions are known to occur at the close of extra-uterine pregnancies, even when the ovum has been attached to the abdominal parietes, showing it to be impossible for the cause of such contractions to be dependent in the least upon the reciprocal action between the foetus and parturient canal. This consideration, weakening his confidence in the dominant theories, and the presentation of other facts to his mental vision, viz.: that natural gestation is always a multiple of the catamenial period, and that abortions generally occur at what would, in the unimpregnated state, have been catamenial periods, led him by degrees to inquire, whether the exciting cause of labor might not be detected in the ovaria. By gradually accumulated facts and observations, and by examining the relation of ovarian excitement to the parturient processes in the different classes of animals, he has proved by demonstration the true cause of labor, and unfolded the correct theory of parturition or ovi-expulsion throughout the animal kingdom.

What, then, is the true cause of labor? The first point to be investigated in determining this question is, the *tendency* of the

uterus to contraction at this period by the application of stimuli. At the threshold of this investigation we would inquire, what is the cause of this *tendency* or aptitude to contraction? Without going into the elaborate details of the experiments and observations, made by Dr. Smith on the lower animals, in relation to their parturient habits, we shall come at once to his conclusions: 1. That there are particular actions really excited by the stimulus of the foetus, and other incidental stimuli, as the irritability from distension, the irritability of compression by the abdominal parietes, etc. 2. That at the time of parturition in the mammalia, the uterus and uterine nervous system are excited by the *ovaria*. 3. It is *ovarian excitement* which induces the permanent contraction of the uterus, which causes the subsidence of the uterine tumor immediately before the coming on of labor, and the *tendency* to those reflex, emotional and peristaltic actions by which parturition is completed.

In menstruation the reflex action extends only from the *ovaria* to the *Fallopian* tubes; this is called by Dr. Smith a small synergic and reflex arc. And in parturition a larger arc is in operation, extending from the *ovaria* to the *uterus*, or the reflex action extends from the *ovaria* to the *uterus*. Now, observation proves that during gestation the ovarian excitement returns, in a slight degree, at each catamenial date; at the eleventh period after conception the ovarian irritation returns as usual, and as the uterine irritation is now at the acme of its intensity, the reflex ovarian action excites the excito-motor nerves of the uterus, and the contractions of labor are induced and continued, until the contents are expelled and the uterus contracted down to its usual ungravid size, and in the same way, and by the same ovarian reflex action, that excites the contraction and rigidity of the *Fallopian* tubes, and continues them during menstruation. Now, where the uterine irritation, from either morbid or physiological causes, is of sufficient intensity to be influenced by the ovarian excitement, at the tenth, ninth, eighth, or seventh month or catamenial period, the result is premature labor at either of the periods at which the contractions may be induced. On the contrary, where the uterine tendency to contraction has not been rendered so perfect by the several causes of irritation, and the ovarian excitement is resisted at the eleventh

catamenial period, the result will be a deferred labor until the next, or some subsequent menstrual period.

Thus it will be perceived that both menstruation and parturition are presided over by ovarian excitement, that both are the result of precisely the same cause, that they are in fact the same function, the latter being modified by the circumstance of gestation, and that menstruation is the parturition of the unfecundated ovum at maturity, while labor is but the parturition of the fecundated ovum at term. Having established the identity of these two functions, the cause of labor is readily and naturally referable to that great controlling power that presides over all the functions of genesis, from the first desire for coition, to the last uterine contraction after delivery, viz.: OVARIAN EXCITATION.

Hence it is clear that in the performance and consummation of the grand function of reproduction, from the sexual congress to the expulsion of the placenta, there are no old physiological laws suspended, nor new ones called into requisition, but that the entire process is amenable to the same universal law governing this department of the female economy, that keeps it in perpetual operation from puberty to the change of life, viz.: OVARIAN EXCITATION.

CHAPTER III.

THE DIFFERENT STAGES OF LABOR AND THEIR PHYSIOLOGY AND MECHANISM.

THE student having now become familiar with the true cause of labor, is prepared to enter into the study of its physiology and mechanism, including the different stages into which it is naturally divided. In order to proceed systematically in this investigation it will be necessary to present first the different *stages*, and then study their physiology and mechanism separately in their numerical order.

Actuated by a laudable desire to facilitate the study of the phe-

nomena of labor, most authors have attempted to divide it into different groups or *stages*; and each succeeding writer aiming to improve upon his predecessor, has erected his own classification, until, according to Cazeaux, "we have some twenty or thirty different systems." The stages of these various systems are based entirely upon arbitrary or conventional data, hence the want of exactness and uniformity that distinguishes the numerous divisions. For example A. Petit gives them without limits or boundary. Stein describes four without defining their limits. Millot admits of four, the first of which he calls the *secret stage*, because of its painless contraction; the second extends from the commencement of the pains to the escape of the waters; the third begins after the rupture of the membranes; and the fourth when the child is on the point of being delivered. Madame Boivin, Chaussier and Adelon give five stages; the former classes the *secret stage* of Millot amongst the precursory signs; the lines of distinction between the stages are but very dimly drawn, except the fifth which indicates the delivery of the placenta. Maygrier with Stein give four, but fail to define them. Denman gives three stages, and is the first to establish the definite limits to his divisions. His first stage commences with the beginning of pain and ends with the full dilatation of the neck or the rupture of the membranes; the second commences here and terminates with the complete expulsion of the foetus; and the third comprises the delivery of the placenta. This division is adopted by most of the European and American authors, sometimes perhaps with some trifling modification. Burns gives but two stages and regards the delivery of the secundines as a second *labor*, which arrangement presents some appearance of plausibility,* because the phenomena attending this supplemental process, are a repetition of a part of those of child-birth in miniature, but at the same time some of the more important ones are absent entirely. Now it is evident that if labor were divided ac-

* Since penning the above statement, an allusion to which fact we find in Meigs' Velpeau's Midwifery, by Harris, page 270, we have examined Burns' Midwifery, by Prof. T. C. James, M. D., from "the fifth London Edition," and find no allusion whatever to the delivery of the secundines being a *second labor*. Burns gives three stages; first the dilating, second the expulsive, and third that in which "the foetal appendages are to be thrown off." In his article on the stages of labor he makes no further reference to this stage; nor does he furnish any dividing lines or boundaries to the other two stages, further than what takes place during their continuance.

cordingly to the uniform, physiological and mechanical stages that must of necessity be present at every parturition, whether of long or short duration, severe or moderate, there could be so great a diversity of views in regard to the matter, as is presented by the various authors who have deigned to enlighten us upon it. There is no difference of opinion in regard to the more obvious facts, observable in the operation as contraction, dilatation, expulsion, etc., because they are *facts* of universal observation, and admit of universal acceptance. Now there are other facts, recognizable in every labor, some of which are less obvious than those just mentioned, but which are equally veritable, and without the due appreciation of the significance of which it is impossible to make any other than an arbitrary or conventional division of labor. But with such an appreciation it is susceptible of a division, according to lines as naturally drawn as those that distinguished contraction, dilatation and expulsion only.

Dr. Tyler Smith whose sagacious mind is never content to linger on the mere superficial phases of physiological inquiry, but delights to traverse fields unexplored before, and to penetrate recesses hitherto unknown ; and from which his favorite science has been enriched by many a brilliant acquisition, has perceived and appropriated these physiological distinctions, and made them the basis of a new division of labor from which there can be no deviation, any more than these can form the circumstances of contraction, dilatation and expulsion, and which we here adopt as the only natural and physiological division ever presented. He divided labor into five stages, as follows, viz. :

“I. The preliminary stage, in which the preparations for actual labor are made.”

“II. The state of dilatation, in which the os uteri is dilated for the passage of the presenting part of the foetus.”

“III. The stage of propulsion, in which the foetus is propelled through the os uteri and vagina.”

“IV. The stage of expulsion, in which the foetus is expelled through the external parts.”

“V. The supplemental stage, in which the placenta and membranes are extruded, and in which the uterus returns to a state of permanent contraction and at length to a state of rest. ,

SECTION I.—THE PRELIMINARY STAGE.

Previously to the accession of actual labor there is a perceptible subsidence of the uterine tumor; this may take place suddenly some two or three weeks in anticipation of the expected event. Or it may be effected slowly and occupy that space of time in its consummation; or it may occur suddenly or gradually but a few days or a few hours before the commencement of actual labor. This is what Millot describes as the *secret stage*, and Madame Boivin and others denominate "the precursory signs of labor." Dr. Dewees says: "The sinking of the uterus has ever been justly considered a favorable circumstance; as it would seem to declare two important facts. 1st. A condition of the uterus itself; and 2d. A healthy conformation of the pelvis.

Let it be designated by whatever title it may, it is uniform in its occurrence anterior to the appearance of the phenomena of actual labor, and is evidently preparatory to that process; it is sometimes so sudden in its accession, and its effects so decided, that the woman is surprised at the smallness of her waist and the looseness of her clothing. By the descent of the uterus, the pressure by the fundus, at the upper part of the abdomen, is removed, the oppressed respiration relieved, and the general mobility of the region increased. Dr. Hutchinson has remarked a peculiarity in the respiration of unimpregnated females, which consists in a greater mobility of the upper part of the chest than is observed in the male; this is what causes the graceful rising and falling of the bosom while breathing in non-gravid women; and is of consequence in affording facilities for respiration, while the action of the lower part of the chest is impeded by pressure of the uterus. The relief of the oppressed respiration is a necessary preparation for actual labor.

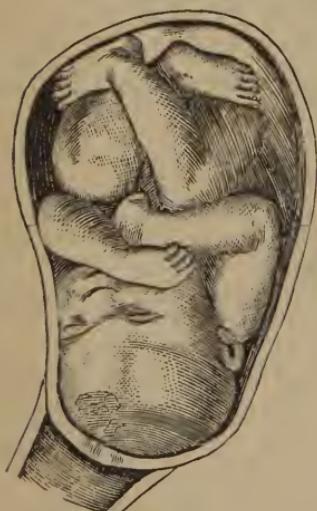
The subsidence of the abdominal tumor is due, first, to equable, persistent, painless contractions, by which the uterine walls become thicker, firmer, and more rigid, and the tumor presents a degree of hardness unusual for it heretofore; the uterus contracts more closely about the foetus, so as to impede its movements and render them next to imperceptible to the woman, who, from the great change in these respects, fancies the foetus is dead, but in which the sound of the foetal heart can be distinctly heard,

through the abdominal walls, by means of the stethoscope or even the unassisted ear. Second, to a sinking down of the uterus bodily, into the pelvis. This takes place just in proportion to the decrease in the size of the organ, from the persistent contraction, which is at the time of labor, not larger than it is at eight months, or eight and a half. These painless contractions continue persistently, from their commencement to the beginning of actual labor, so the uterus is less voluminous at this epoch than at any other period during this stage.

It is during this stage that the cervix uteri becomes entirely obliterated, by being expanded into the body, of which it is made to form the most inferior part. The os presenting only a mere ring at the inferior extremity of the ovoid body of the uterus, looking downwards and backwards into the vagina. This obliteration of the cervix contributes to the subsidence or sinking down of the abdominal tumor. After this change takes place the woman feels less clumsy and encumbered, is more agile, light and free in her movements, feels very well, and begins to think she has made a mistake in her reckoning, and that her time is not so near at hand.

During the continuance of the preliminary stage there is usually extended to the sphincters of the rectum and bladder a sympathetic irritation, and there is present what authors call the precursory signs of labor, viz.:

FIG. 80.



CONDITION OF THE CERVIX UTERI
AT THE CLOSE OF THE PREPARA-
TORY STAGE.

more or less diarrhoea, and inclination to evacuate the bladder; this at times amounts almost to incontinency, and is generally, but often erroneously, attributed to pressure. The effect of this disposition to evacuate these viscera, is to relieve them of any accumulation that might otherwise collect, and so fill up the cavity of the pelvis as to impede the free passage of the foetus. When the bladder and rectum are not thus spontaneously emptied, it must be done by means of the catheter and laxatives or enema.

In this stage, *the only excitor nerves involved are the ovarian*, and to these the uniform contraction of the uterus is due. Let it be observed that the *ovarian excitement* is the *first* in the order of events; which is followed by the spinal excitability, and is almost universally marked by pains in the back; in the subsequent stages, which increase in severity, as the spinal irritability increases in intensity; the action of *the uterine-motor nerves*, and the impulsion of the presenting part of the foetus against the os uteri. The latter, in its turn, gradually excites the contraction and dilatation of the next stage of the process. The duration of this stage is usually the greatest of the five.

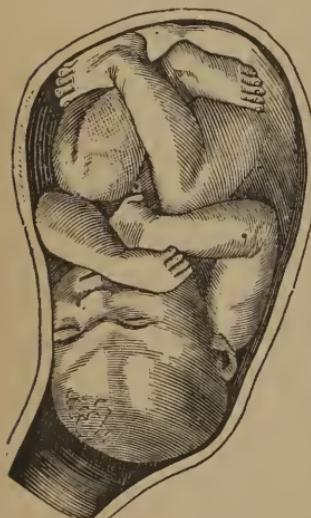
SECTION II.—THE STAGE OF DILATATION.

At this point of our obstetrical inquiries, we encounter the initiatory phenomena of actual labor. The incursion of this stage is usually announced by a slight uneasiness, at first in the loins, which is only momentary in its duration, and presently subsides, leaving the patient at ease. In ten or fifteen minutes it again recurs, and again passes off. At an uncertain time, sometimes earlier and sometimes later, from a few minutes to an hour or two, the returning paroxysms of uneasiness become more and more distinct, gradually getting worse and worse until they eventuate in decided, well-marked labor pains, which now begin to extend around the sides, and concentrate in the uterine tumor in front; regularly alternating with intervals of perfect ease. These pains become more and more severe, and of longer duration, as the labor advances, while the intervals between them are proportionally diminished.

After the pains become well established, there will be observed escaping from the vagina a muco-sanguineous discharge, known in obstetrical language as "the show;" this consists of mucus, tinged with blood, and is always regarded as positive evidence that labor has actually commenced. Other vaginal discharges may be present, as those of leucorrhœa, which is generally untinged with blood, and again there may be a slight hemorrhage unmixed with mucus. These may occur at other times than the beginning of labor, and without inspection or close inquiry, be mistaken for "the show," and a wrong diagnosis be the result. This excessive mucus secretion is derived from the glands of Nabothi, that

abound in great numbers about the os and cervix uteri, and being thrown into a state of undue excitement, by the agitation of the uterus, eliminate their natural products in great quantities; and the blood mixed with it, proceeds from a slight disturbance of the placento-uterine adhesion—hence the presence of the show indicates the uterus in a state of unusual commotion, and the pains declare the character of that commotion. Regular pains and “the show,” occurring together, leave but little room to doubt the real character of the sickness.

FIG. 81.



THE CONDITION OF THE OS UTERI
DURING THE STAGE OF DILATATION.

This stage is distinguished from the preceding one, not only by sensation and secretion, but also by motor action. Each pain is accompanied by a decided contraction of the fibres of the uterus in all its parts, while the os is, at the same time, placed in a state of dilatation, rendered soft, yielding, and is distinguished by a circular opening. It may appear paradoxical, to the student, to say that the uterus contracts in all its parts and at the same time dilates in one part, the os; but such is nevertheless the case; and this apparent contrary action has given rise to a great deal of discussion, and many opposing hypotheses. Perhaps the real explanation has not yet been given, nor understood, though many attempts at it have been offered.

Dr. Tyler Smith, usually correct in his observations and clear in his perceptions, has certainly made an erroneous declaration when he says: “Obstetricians differ much respecting the nature of these contractions and dilatations, and elaborate descriptions are often given of longitudinal, and oblique, and circular fibres, and one set of fibres overcoming the other, *which really have no existence, anatomically or physiologically.*” It is difficult to understand how contraction or dilatation can be effected by reflex action, without a fibrous arrangement; the muscles contract and dilate, through the medium of their fibres; the heart, the stomach, the intestines, the bladder, in fact, all the contractile organs owe their power of

contraction and dilatation to their fibrous structure. It is sheer folly to speak of the contraction and dilatation of an organ, and at the same time deny in it the existence of fibres ; and, moreover, the fibrous structure of the uterus has been abundantly demonstrated, as will be seen by referring to the anatomy of the uterus, as given in the fore-part of this work ; and the "longitudinal, and oblique, and circular fibres" will be found to be more than mere myths, or imaginary existences ; they are proved to be real entities, substantial, tangible substances—as much so as any structures in the body.

By referring to the arrangements of the fibres of the uterus, it will be perceived that those of the fundus and body are so disposed as to contract the organ in every direction at once ; the contraction of the lateral and oblique fibres support the body of the foetus in the direction of the axis of the uterus, and prevents it from being pushed either to one side or the other, while those running longitudinally contract upon it in the direction of its long diameter, force or propel it forwards, in direction of the axis of the uterus, downwards and backwards through the os uteri into the vagina. Now, it will be perceived, that the effect of these contractions upon the foetal body are purely mechanical, the one set maintaining it in its proper position, while the other propels it forwards. The arrangement of the fibres of the cervix and os is different ; they are disposed circularly, entirely so ; they are not so large and strong as the corresponding ones of the body and fundus, nor are they found in so great numbers, in a given space, as the others. The effect of this arrangement is, while they remain permanently contracted, during pregnancy, they are abundantly sufficient to keep the os and neck closed, to prevent the foetus from escaping, and at the time of parturition, to become relaxed, in harmony with the contraction of those of the body and fundus, which are much more numerous and of greater strength. But, as it has been stated, that the uterus contracts, during each pain, simultaneously in all its parts, it may be asked by the student, how can the os contract and dilate at the same time ? We will endeavor to answer that question by the application of a general law of the economy, and one of universal recognition, viz.: that of waste and supply, of excitation and depression, or effort and exhaustion. The manner of the induction of the uterine con-

tractions, through ovarian irritation, has been described already. Let it be borne in mind, that this ovarian irritation is constant during a catamenial nisus, and, through reflex action, excites the Fallopian tube to contraction, by which the unfecundated ovum is propelled through the tube into the uterus. So, also, is it constant during the parturient process, and, in like manner, excites the uterus to contraction, by which the foetus is propelled from the uterine cavity into the vagina. Now, what we desire to particularly impress upon the mind of the student, is the fact, of the constancy or persistency of the ovarian irritation throughout the whole process of labor; it is not intermittent, or alternating, with moments of activity and then of quietude, as we see manifested in the actions of the uterus during labor, but it is continuous and unabated, from the first painless, to the last contraction of the uterus, after the expulsion of the placenta.

The irritable state of the uterus, at the close of gestation, favors the action of the excito-motor nerves, and contraction of the uterine fibres is the result; which is, at first, painless, but as the contraction continues into the second stage, which is marked by a slight uneasiness at first, it continues, at intervals, to increase, until perfect regular labor-pains are established. As the second stage is a continuation of first, the forces operating are the same, the continuation of which have developed the additional phenomena incident to the more advanced state of the process, viz.: sensation, alternation, secretion and dilatation. Now, the persistence of the painless contraction produces additional irritation to the uterus, until sensation is developed; and after so long a continuous contraction of the fibres, a degree of exhaustion or inertia is induced, during the continuance of which the ovarian irritation is unable to act as an excitant until a degree of rest is acquired, when it again excites the contractions; the increased exertion of the fibres again induce exhaustion, when the fibres become recuperated by sufficient rest, action is again excited; each contraction causes additional irritation of the uterus, which is manifested by increased sensation; so we have contraction, sensation, exhaustion, recuperation, involved in each labor pain, and its interval of ease. This explains the alternation of pain and ease.

During the state of exhaustion, the os uteri, possessing less fibres and smaller ones, *less material to be acted upon*, does not ac-

quire the same amount of recuperation or nervous force as do the body and fundus, and, of course, is not so thoroughly excited, nor so violently contracted as they are; so, while the contractions of fundus and body are constantly increasing, from the constantly increasing irritation, those of the os are as constantly diminishing, from the constantly diminishing irritation. That the os uteri contracts in common with the rest of the uterus during each pain, can be readily determined by placing the finger within the os during the interval of the pains, and allowing it to remain there until the pain comes on, when it will be observed to get rigid and hard, and remain so during the continuance of the pain; as it subsides, the os will again resume its soft and flaccid condition; and it will be further perceived that, as the labor approaches its termination, the rigidity of the os, during the contraction, will be less dense, and continue to become less and less so, at each succeeding contraction; but, during the contractions, the os will present a greater degree of hardness, than during the intervals, and a decided difference will be noticed until the last, when the os will be less contracted than at any previous pain, while the contractions of the fundus and body will be the most severe and protracted. Thus, observation proves that the os contracts, throughout the whole process, in common with the rest of the uterus, but that the contractions of the os diminish, from exhaustion, as those of the fundus and body increase.

While we repudiate the idea that the os uteri is dilated, mechanically, by the pressure of the uterine contents upon it, during the contractions of the uterus, we also dissent from the opinion that it is "overcome" and forced open by the superior strength of the fibres of the fundus and body, directly applied. But that the os not being furnished, anatomically, with a supply of circular fibres equally with the fundus and body, is incapable of sustaining the amount of contraction, endured by the latter, and consequently, is so far overcome by exhaustion or inertia, as to be able, ultimately to coöperate but slightly with the contractions of the fundus and body. This inertia of the os remains, for several hours after the delivery of the child and placenta, and contracts very slowly during convalescence. In protracted or very severe labors the inertion or exhaustion of the uterus continues sometimes for several hours, during which the effects of the uterine excitability, and ovarian

excitement have no influence in exciting contractions, and labor is suspended, until the organ becomes recuperated by sufficient rest. Every movement or effort of every member or organ of the body, is attended with waste, and this waste is followed by supply ; just as inevitably as effect follows cause ; and should this law become suspended, death would result from general exhaustion. It is by the operation of this general law of the economy, that the intermissions of labor, and the dilatation of the os are effected.

Dr. Smith again observes, "There is harmony and adaptation existing between the actions of the different parts of the uterus, that whenever the fundus uteri contracts, the *os uteri has a positive tendency to dilate.*" Now what is this "tendency to dilate" but a degree of exhaustion of the fibres of the os uteri? By denying the existence of these fibres, Dr. Smith forestalled himself, and shuts out from his vision the only rational explanation of the apparently opposing actions of the uterus, which could not have escaped his keen perception, had he not allowed his theory to obscure the fact. But such is universally the case, when men abandon facts, and resort to ideality for the solution of abstruse problems, they are liable to fall into error, or involve their subject in darker obscurity, however great or learned they may be.

During this stage the pains are shorter, sharp and more cutting, and the intervals between them longer, than obtains in the subsequent stages ; the woman is loth to lie down, but prefers walking about the room, stopping and leaning upon the bed-post, the back of a chair, or the arm of an attendant, during the pain.

Nausea and vomiting are often present during the whole of this stage, the cardia being dilated, like the os uteri, by reflex action, or, as it is generally considered, by sympathy. If this be escaped during the earlier periods of the stage, it is generally encountered towards its close, when the medulla oblongata, which presides over the organs of respiration and nutrition, becomes involved.

It is during this stage that the woman is most desponding, and most apprehensive as to her safety, or impatient and fretful ; sometimes she is obstinate and refractory, refusing to submit to necessary direction. But all these mental aberrations subside as the labor advances, and the pains become more severe. She then finds she has something more to entertain her, than such freaks of folly.

At the close of the stage, which is announced by the full and complete dilatation of the os uteri, or a softness and pliability equivalent to a complete dilatation, through which, during a pain, the membranes, filled and tense and elastic, will be found protruding. The whole system is often shaken with a violent rigor or chill, the patient complains of feeling very cold, and asks for more clothing, her teeth rattle, and every muscle in her body appears to be violently agitated; sometimes during the rigor, there are evidences of more or less delirium; and nervous delicate women have glided into convulsions during these rigors.

According to some writers, the spontaneous rupturing of the membranes and the discharge of the waters, constitute the signal of the termination of the dilating stage. As the time for the rupturing of the membranes is by no means certain, this event cannot be at all conclusive that the dilatation of the os uteri is complete, or that it has not been dilated for some time previously.

Dr. Rigby thus describes the formation of the membranous bag of waters, that now constitutes a very important part of the inquiry: "When the os uteri has dilated more or less, a quantity of liquor amnii begins to collect between the head and the membranes, so that when a pain comes on they form a dense, elastic and conical bag, which presses firmly against the os uteri, and protrudes through into the vagina, and from its form and elastic nature greatly facilitates the speedy dilatation of it. If the edge of the os uteri be still thin, it will become so tense during the pain, and the bag of the membranes will press so firmly against it, that we shall have some difficulty for the moment in distinguishing the one from the other. As the labor advances, the intervals between the pains become shorter, whereas the pains themselves are of longer duration and more effective. In this way pain succeeds pain, until the os uteri at length attains its full degree of dilatation; and if the membranes have not yet ruptured, we may now expect them to burst with every succeeding pain."

During the dilating stage, the os uteri is as much under the control of ovarian action as the fundus and body are, and its dilatation is as much due to it, as are the contractions of the latter. At the time of the full dilatation of the os, the sphincters of the bladder and rectum are apt to be excited by reflex action, and an uncontrollable desire to evacuate these viscera, continues to harass

the patient, so long as they remain unemptied; by having the bladder and rectum evacuated in the early part of labor, the patient may be saved much additional annoyance, and the accoucheur a great deal of unnecessary trouble and inconvenience.

The pains of this stage—those of the early half of it, especially, are almost entirely free from the bearing-down character that distinguishes those of the subsequent stages; as the os uteri becomes more completely dilated, and the end of the stage approaches, the pains resemble more and more those that characterize the third stage. They grow less sharp and cutting, become harder, stronger, and more bearing down in their action as the second merges into third stage. The transition from one stage to another is gradual, though the lines between them are well marked.

In the dilating stage *the ovarian nerves and those of the os and cervix uteri* are the excitors, and the *motor nerves are those of the uterus*. As the motor actions are confined almost entirely to the uterus, the motor nerves involved are limited to those of that organ. "The portion of the spinal centre involved is the lower medulla."

The duration of this stage is generally shorter than the preceding one, but longer than either of those that succeed it. The stages diminish in duration, but increase in force and efficiency as the labor approaches its termination.

SECTION III.—THE STAGE OF PROPULSION.

At the commencement of the dilating stage, the uterus with its contents consists of an ovoid body, with a small, round aperture, the os closed, or nearly so, in the centre of the apex or small and inferior end of the figure. The uterus at this period, when normally situated, lies with the axis of its long diameter corresponding with the axis of the superior strait of the pelvis, with the os looking downwards and backwards into the vagina. The foetus being enclosed in this ovoid body, has the axis of its long diameter of course corresponding with that of the uterus. The head of the foetus in utero is at this period situated above the superior strait. Now as the contractions of the longitudinal fibres of the uterus are in but one direction, viz.: that of its long diameter, by the time the os uteri becomes fully dilated, the head has been made to enter the inlet; and the present or propulsive stage finds it nearly or

quite occupying the cavity of the pelvis, partly disengaged and partly engaged in the os uteri. During this process of dilatation and the descent of the head, the membranes usually rupture spontaneously, and the liquor amnii partly escapes with a gush; this occurs during one of those hard, strong contractions, that generally characterize this period of the labor. A portion of the liquor amnii is retained, and expelled from time to time during the labor.

Such is the state of affairs at the incursion of the third or propulsive stage, when a new direction is given to the motor forces of parturition. The direction of the head is now downwards and forwards, corresponding with the axis of the inferior strait or outlet, while the body of the foetus remains in direction of axis of the superior strait; hence the application of force is required in two directions: one in reference to the body by which it is continued downwards and backwards, and the other in reference to the head to propel it downwards and forwards, the body being flexible, these two directions are maintained henceforth to the end of the labor.

The partial evacuation of the waters allows the contracting uterus to come in direct contact with the structures of the foetus, these being more firm and resisting than the bag of waters, hitherto pressed by the uterus during its contractions, impart further irritation to the excitor-motor nerves, and corresponding strength and efficiency is obtained by the contractions; hence the augmentation observed in the power and efficiency of the pains, after the bursting of the membranes and the passing off of the waters. But this newly acquired force is applied almost entirely to the body of the foetus, to propel it in the direction of the axis of the uterus and superior strait. While the head and

FIG. 82.



THE CONDITION OF THE OS UTERI AND POSITION OF THE HEAD DURING THE STAGE OF PROPULSION.

such parts of the body as immediately follow it, in its passage through the inferior strait, must derive their principal motive power from some other source or sources. This emergency is provided for in the respiratory apparatus and the power of volition. The abdominal muscles, hitherto greatly distended by the enlarged uterus, become relaxed after the size of that organ has been diminished by the escape of the waters, so that they are in a condition to contract when brought into requisition, which is at just the time when such additional aid is required. As the head passes through the os uteri, and presses upon the upper portion of the vaginal surface, we have another set of excitors brought into action, viz.: the vaginal nerves, which are in relation with the lower medulla, and which give additional strength to the uterine contractions, and at the same time involve the medulla oblongata by their direct relation to it. The manifestation of the new accession of power is seen in the further augmentation of the force and efficiency of the uterine contractions, and in the respiratory efforts of the patient, and the involuntary straining or bearing down during each pain, which the patient may be advised to encourage and aid by voluntary efforts in the same direction. These, solicited during the dilating stage, or before there are any involuntary or spontaneous efforts, are always annoying, as any attempts at forced straining are fatiguing and unnecessarily exhausting, and of no benefit whatever. But during the stage of propulsion, by this straining or bearing down, which is only a modification of the respiratory efforts, much aid can be derived by the contraction of the abdominal muscles upon the uterine tumor, exciting the uterus to more powerful action, and by their direct expulsive power. Not only are the contractions of the respiratory abdominal muscles, as exhibited in the straining or bearing-down efforts, of advantage during the ordinary pains, but weak and inefficient contractions are often rendered stronger and more efficient, by aid thus voluntarily imparted.

Dr. T. Smith thus describes, *seriatim*, the motor phenomena of the contractile part of a pain in this stage: "At the coming on of each pain, the patient takes a deep inspiration, as a preliminary. Expiration then takes place slowly and forcibly, in a succession of gasps, and when the air in the thorax is diminished, it is suddenly renewed by hasty inspirations. Each pain consists, as far as the

respiratory muscles are concerned, of several sudden and deep inspirations, followed by prolonged and laborious expiratory efforts, with the glottis partially or entirely closed. At the acme of a pain in this stage of labor, the glottis and cardiac are entirely closed, the glottis only opening partially at intervals, and the abdominal, and all the other, ordinary and extraordinary, muscles of expiration being forcibly contracted. The diaphragm remains inert, as in vomiting, with the action of which, except that the cardia is closed instead of opened, the actions of the expiratory muscles in labor may be compared. All obstetric writers have taught that the diaphragm contracts in this stage; but if it be considered for a moment that the diaphragm is a muscle of inspiration, while the actions of parturition are expiratory, the fallacy of such a view of the action of the diaphragm must at once appear. Of the contraction of the abdominal muscles during this stage of labor there can be no doubt; and the actions of the diaphragm and abdominal muscles are antagonistic. It is true that the floor of the diaphragm, instead of being arched, as in an ordinary state of relaxation, remains plane, during the efforts at inspiration, with the glottis closed; but this is from the mechanical distention of the chest by the contained air, not from an active contraction of the muscles itself. Besides these actions, which are all involuntary and reflex, the patient voluntarily aids in fixing the thorax, by holding some fixed body in her hands, or planting her feet firmly. More than this, she increases all the expiratory actions by strong efforts of the will, and by that emotion of labor which impels her to brave every suffering to affect the birth of the child. At length when the pain can no longer be borne, the short gasp or groan is exchanged for a cry which dilates the glottis, and the pain and contractions subside. The cry is a motor action, excited by the emotion of pain, and instantly relieves the uterus of all extra-uterine pressure. Thus the glottis may be compared to a safety-valve, which is thrown open whenever the pressure becomes more than can be borne with safety. By the influence of volition we have this valve entirely under our control, to open or close it, as may be necessary. When the expiratory actions are weak, we can enjoin the patient to hold her breath, and when they are too intense or too long continued, we can encourage her to cry out, which is of course equivalent to dilating the glottis, and expiring the contents of the thorax. During all

this time the uterus contracts powerfully." The physiological line of demarcation between this stage and the next one succeeding it, is the complete rotation of the head. The duration of this stage, is usually much shorter than the preceding one.

The nerves involved in exciting the motor actions of the uterus, in the stage of propulsion are the *ovarian and uterine nerves*, and those exciting the respiratory modifications, favoring the descent of the head into the inferior strait or outlet are the *vaginal nerves*, which are in relation with both the medulla oblongata, which presides over respiration, and the inferior spinal medulla, from which the reflex action extends to the uterus. The motor nerves excited to action are the *uterine nerves*, and all the *motor nerves influence the expiratory muscles of respiration*.

SECTION IV.—STAGE OF EXPULSION.

FIG. 83.



THE POSITION OF THE HEAD AT THE COMMENCEMENT OF THE STAGE OF EXPULSION—AFTER ITS ROTATION.

This stage, in labors of the first presentation of the vertex, finds the occipito-frontal diameter in direction with the long diameter of the outlet, that is, the occiput, under the arch of the pubis, and the face occupying the hollow of the sacrum; the head having completed its rotation with the termination of the last stage.

The head having passed through the different stages, in its descent, is now presented at the external orifice of the vagina, awaiting a few energetic efforts of

the uterus to cause its entire expulsion. This stage is a continuation

of all the actions of the preceding one, there being no perceptible difference between them, other than an augmentation of all the phenomena characterizing the stage of propulsion, and the shortness of its duration. It is the shortest and most decisive of all. The pains are harder, of longer duration, and the intervals shorter, the nearer the struggle approaches its close. In fact the contractions often follow one another in such rapid succession, that there can hardly be perceived any intervals between them ; but the process of labor appears to be terminated by one long, continuous pain, of most exhausting severity and power ; the woman scarcely being able to catch her breath, amid the hurricane of contractions that seem to be rending her to pieces. It has been said of this stage, that "It often compresses into a few moments as much suffering and as much concentrated action of mind and body, as would go to an age of ordinary life."

The intensity of the sufferings of child-birth, reaches its acme at the time the head escapes through the ostium vagina ; and what adds to the extremity of torture, is the excruciating feeling of laceration at the perineum. As there can be no yielding at the arch of the pubis, nor space gained by the separation of the rami of the pubis and ischia, the greatest tension is placed upon the perineum, as the most voluminous part of the head passes the vulva. At this point, many women, who have borne their sufferings with the most heroic courage, fail to endure it longer, but give vent to their long-controlled feelings in a loud cry of mingled anguish and despair. This cry is partly emotional and partly reflex; its utterance is accompanied by a flying open of the glottis, which is not accidental or voluntary, but reflex in its action, and as much involuntary as any other of the actions of parturition. As it occurs at the time the woman is firmly fixed, her hands grasping some stationary object, and her feet planted immovably against a solid support, her thorax fully inflated, and all the powers of the respiratory muscles concentrated in giving additional strength to the powerfully contracting uterus, it comes as an angel of mercy, and prevents the laceration of the perineum and adjoining structures, by arresting and withdrawing the respiratory action at the moment interference is demanded by safety. The severe tension of the perineum is further relieved at the same moment, by the simultaneous dilatation of the sphincters of the rectum and bladder, by

means of which increased space of internal and external surfaces is, for the time, afforded the perineum and soft passages. During these complicated physiological actions for the relief and protection of the greatly distended structures—and, without which, extensive and destructive laceration would, in almost every instance, be inevitable—the severely distended perineum is made to retract over the head, by the action of the levator ani muscle, which constitutes a large portion of its structure, and the head glides into this outer world, with the occiput mounting upon the mons veneris, and the face sweeping the sacrum and perineum. By the same contraction, or a succeeding one, the body is expelled, and the struggle ended.

The ovarian, the uterine, the vaginal nerves, and those of the orifice of the vagina, constitute the excitors of the explosive stage—these continue to act through the superior and inferior portions of the spinal cord, as in the stage of propulsion. *The uterine, vaginal, respiratory nerves, and those of the sphincters of the rectum and bladder,* are the motor nerves excited during the stage.

Thus, in labor, we have the same power that supplied, through the ovarian nerves, acting throughout, from the first painless contraction to the final consummation of the process. The different phases, as manifested in the several stages, are induced by the augmentation of this power from different sources, as the respiratory nerves and the various excitor nerves that are called into action as the labor progresses; and in this, the closing stage of actual labor, we have a convergence of currents from all the sources, into one grand master-stream, that discharges itself upon the motor forces of the uterus, enabling it to exert the most stupendous strength in effecting the expulsion of the foetus.

Dr. T. Smith closes his observations on the stage of expulsion, with the following remarks: “Although, it must be conceded, that parturition is the most voluminous of all the motor functions. The human uterus contracts sometimes sufficiently to render the hand of a strong man powerless. In order to illustrate the wonderful muscular power of the heart, the circulation in the whale or the elephant is often referred to by physiologists; but, enormous as is the power of the heart in these animals, the parturient actions by which they bring forth their enormous young, give us the most colossal idea we can entertain of any single muscular action. In the

human subjects, too, there is a certain grandeur in the combined efforts brought into play in parturition. In women even of moderate strength and stature, every voluntary muscle of the body is in strong action; the excito-motor force is in a state of the greatest activity; the uterus, unseen, and without any participation with the will, is making its immense contractions; and emotion imparts strength to both voluntary and reflex actions. At this juncture it is that the accumulated effects of a natural labor pass most readily into the convulsions of the puerperal state, the most tragic spasm we can ever witness, often more terrible than even tetanus or hydrophobia itself. A momentary calm follows the energetic action which issued in the delivery of the mother. After the excessive action, in which nerve and muscle seemed strained to the utmost pitch, there comes a sudden and profound repose; there is perfect freedom from pain; every fibre is relaxed; only the uterus now contracts, of all the muscles which were so lately struggling. Like some ship, which turns from a tempestuous sea into a safe and quiet harbor, the new mother passes from the storm of childbirth, into the quiet haven of maternity. In the pathetic words of Scripture: ‘A woman, when she is in travail, hath sorrow, because her hour is come; but as soon as she is delivered of the child, she remembereth no more the anguish for joy that a man is born into the world.’”

SECTION V.—THE SUPPLEMENTAL STAGE.

After the child has been expelled by the motor actions of the uterus, and the woman has enjoyed a grateful respite from suffering, of longer or shorter duration, ranging from ten to thirty minutes, she is reminded by the recurrence of short twinging pains that her travail is not completed, but that the supplemental part is yet to be encountered. This, when conditions are perfectly normal, is of short duration, and void of any great suffering. It consists of the extrusion of the secundines, or what some authors denominate the appendages of the foetus. Sometimes this stage follows the stage of expulsion so rapidly that it is difficult to distinguish any intermediate time between them, but both the foetus and placenta appear to be thrown off by one and the same contraction. This, however, is not the case, only where the last expulsive effort of the uterus is unusually severe and prolonged, and in which is involved

the supplemental stage. Generally there is a perceptible space of time between them, and the latter is formally introduced by the incursion of pain, which is followed by the phenomena of the stage of expulsion in a miniature degree. We have the contractions, holding the breath, and the bearing-down efforts. Sometimes the first pain is attended by the entire expulsion of the placenta, and at other times it requires two or three repetitions to effect it. Often by the first contraction after the birth of the child, the placenta is expelled from the uterine cavity and lodged in the upper part of the vagina, sometimes two, three or more contractions are necessary to effect this transfer from one cavity to the other. When such an occurrence takes place, the inexperienced accoucheur, who waits for the spontaneous escape of the placenta, is much perplexed, as it prolongs retention, and concludes that it is delayed by abnormal adhesions or from some other morbid cause. After waiting several hours, its presence in the vagina excites contractions in that organ similar to those of the uterus, and its expulsion is the result. Sometimes the vaginal contractions are induced and the placenta discharged in a much shorter time. And it often comes away upon the woman being raised up or changed in position, by its own gravity.

The placenta seldom retains its connection with the uterus after the birth of the child. During the powerful contractions of the expulsive stage, and especially the last one, its separation is effected; after which it lies loose in the cavity of the uterus until its presence causes a renewal of the uterine contractions which effects its expulsion. This is a part of the economy. The attachment being no longer necessary for the preservation of the utero-placental circulation, it is spontaneously dissolved, and in due time expelled.

Its escape is generally attended with a gush of blood, which has evidently accumulated in the uterus, after its separation, and before the contractions were sufficient to compress the vessels and arrest the flow; and the placenta, lying in the os uteri, acts as a plug and prevents its escape, as it flows from the vessels into the uterine cavity; but when the contractions are sufficient to expel the placenta they at the same time arrest the hemorrhage, and after the first gush of accumulated blood, the discharge is quite moderate and gradually decreases as the contraction becomes more

perfect, until the discharge consists of the lochia only. The placenta generally presents with its smooth foetal surface to the os uteri, with the shaggy, uterine face inwardly, covered with blood and clots; as it passes through the os uteri it assumes the shape of an inverted cone, with the cord at the apex, and the base, which is the uterine surface, excavated or cup-shaped. Sometimes it presents with one edge; and occasionally after its separation from the uterus, it is found in the cavity rolled up, presenting an elliptical body and presents with one end to the os uteri, and is so expelled.

After the placenta, the bare surface of the uterus at the part it occupied, is intensely excitor, and the placenta now a foreign substance lying in contact with it, excites the first contractions or after pains; these propel it down to the os, which, with the vaginal surface, being greatly excited by the passage of the child, are intensified as excitors to motor action and by contact with the descending placenta augment the contractions of the uterus sufficient to expel the mass, and membranes from its cavity.

After the completion of labor, by the final and entire expulsion of the placenta, the uterus, responsive to various distant excitors, as the irritated mammae and stomach, excited by the application of the child to the former and the reception of ingestra by the latter, the influence of the emotions, and the continued ovarian action, continues its contractions until it is reduced to its non-gravid condition, and ceases to be a motor organ. And the rapid diminution of the vascular and other tissues by absorption, soon reduces it to near its primitive size. Entirely recovered from the effects of gestation, and the excessive and stupendous exertions of parturition, it remains in a state of quietude and rest, until its repose is again disturbed by a subsequent conception.

The excitor nerves involved in the supplemental stage, are *the ovarian, uterine and vaginal, together with the mammary and gastric nerves*; the spinal centre and motor nerves are effected in the same manner as in the preceding stages, only in a minor degree.

CHAPTER IV.

THE DURATION OF LABOR.

WE have no data upon which a true estimate of the duration of labor can be based. No two women can be regarded alike in this respect; nor is the time consumed in consummating one labor, to be taken as a criterion for another one in the same woman.

There are a few circumstances, however, with which observation has supplied us, that may be made available in forming a prognosis, as to the probable duration of labor after it has actually commenced. As a general rule, to which there are exceptions, the first labors are more protracted than those that occur subsequently. This may be owing to two causes: 1st, the os uteri and soft parts generally dilate with more difficulty the first time, than after they have been once fully dilated. And 2d, the uterine contractions are more imperfect in *primipara* than in after labors; hence the dilating stage is much prolonged, and the stages of propulsion and expulsion are accordingly retarded in proportion to the deficiency of the contractions.

Women who are the most complaining during the latter part of pregnancy, provided they are able to take proper exercise, generally have shorter and easier labor, than those who continue robust and strong throughout the whole period of gestation. Labors with male children are usually more protracted and difficult than those with females, because of the greater size of the head of the former.

Where a tedious or protracted labor results from a narrow or slightly deformed pelvis, the same difficulty may be expected in each subsequent labor; so far, we may judge of the probable duration of a labor, by the length of a preceding one in the same woman. Women who are favorably organized, that is, with relaxed fibres and ample pelvis, usually have quicker labors than those of dense fibres with equally favorable osseous structures.

When the woman is small and delicately organized, with a pelvis of due proportions, but small, in harmony with her stature, and the husband large and bony, her labors will be likely to be severe

and protracted, especially where the product of conception inherits the organization of the father. In such cases, there is a disproportion between the size of the foetus and the diameter of the pelvis, which has to be overcome by the continued action of the uterus.

Though there is no aggregate uniformity in regard to the duration of labor in women, taking large numbers together, in the absence of mechanical obstructions, nevertheless there are individual instances, where women are remarkable for their uniform quick and easy labors, while others are equally distinguished for their severe and protracted ones. But such is by no means unusually the case, for a woman may have a very quick and easy accouchment at one time, and a severe and protracted one the next, and *vice versa*. There are but few experienced accoucheurs who cannot calculate, with a very satisfactory degree of certainty, the probable duration of labor in some of their patients, whether long or short, when first summoned, from their knowledge of their previous labors. While, with a great majority of their cases, they can make no such estimate, as women are frequently tedious in one labor, and perhaps extremely quick in the next, and this variation cannot be foreseen from any previous symptoms or state of the system.

Various circumstances may conspire to produce this difference in different labors, such as debility of the uterus, excessive rigidity of the os uteri, premature evacuation of the liquor amnii, improper irritation, injudicious voluntary efforts, etc.; these, or some of them, may tend to prolong the stage of dilatation, while their absence, and the presence of more favorable conditions, will tend to facilitate the process through this stage. The stages of propulsion and expulsion may be rendered tedious, from irregularity or inefficiency of the uterine contractions, or from a suspension of the bearing-down efforts, or from the head not rotating in the most favorable direction, or from rigidity of the external organs, while the presence of opposite conditions would insure a speedy termination of the labor.

The duration of labor is influenced by the condition of society, by the habits of different countries, by savage and civilized life. In proportion as we remove woman from a state of simplicity to luxury and refinement, we find the powers of the system become

impaired, and the process of parturition is rendered more tedious and painful. In a state of natural simplicity, women in all climates bear their children easily and speedily, and recover rapidly. The Greenlanders, mostly, do all their common business just before and after delivery, and a still-born or deformed child is seldom heard of.

Long tells us that the American Indians, as soon as they bear a child, go into the water and immerse it. One evening he asked an Indian where his wife was : "he supposed she had gone into the woods to set a collar for a partridge." In about an hour she returned with a new-born infant in her arms, and coming up to me, said, in the Chippewa tongue : "*Oway saggonash shomagonish,*" which, rendered in English, reads : "Here, Englishman, is a young warrior."

Lempriere says : "Women in this country, (Morocco) suffer but little inconvenience from child-bearing. They are frequently up the next day, and go through all their duties, with the infant on their back."

Winterbottom says, that with the Africans the labor is very easy, and trusted solely to nature, nobody knowing of it till the woman appears at the door of the hut with the child.

Bruce, in his travels, tells us that the Shangalla women bring forth children with the utmost ease, and never rest or confine themselves after delivery; but washing themselves and the child with cold water, they wrap it up in a soft cloth, made of the bark of trees, and hang it up on a branch, that the large ants with which they are infested, and the serpents, may not devour it.

Bartolomeo observes, in Otaheite, New South Wales, Surinam, etc., parturition is very easy, and many more instances might, if necessary, be adduced. We are not, however, to suppose that in warm climates women do not sometimes suffer materially. In the East Indies many of the women lose their lives the first time they bring forth.*

Labors are generally of shorter duration, and easier, in warm countries than in cold. It is thought the relaxing influence of warm climates has a permanent effect upon the muscular fibres, rendering them more yielding, than where the climate is rigorous and bracing; for example, women bring forth with greater

* Burns' Midwifery.

facility in Italy, Spain and Portugal, than in France, Russia and Germany. The lives of idleness and luxury incident to warm countries, perhaps conspire to relax the fibres, while the laborious exertions, and plainness of living in the more inhospitable regions, contribute to render them rigid and resisting.

Labors in temperate latitudes sometimes continue through twenty-four, forty-eight, and even seventy-two hours, from the first incursion of *pain*, or the commencement of the dilating stage; and terminate spontaneously with safety to both mother and child. At other times they do not occupy more than one or two hours. The average duration of labor in the United States is estimated at about six hours, though the accoucheur is not often called before the process is pretty well advanced, which gives the appearance of a much shorter aggregate time.

CHAPTER V.

PUERPERAL PAINS.

THE pains pertaining to the puerperal condition are divided into "false or spurious," true, and after pains. Sometimes women are attacked with pains, from a week to a fortnight before the expiration of gestation. These pains bear so strong a resemblance to those of labor, as often to deceive the patient and her attendants. The accoucheur is called, and preparations are made for the accouchment. This is what women call a "false alarm." These, that are termed "false or spurious" pains, may be stationary and confined to the back, or they may be erratic, flying from one place to another. They may be constant, continuing without intermission, or they may intermit with periods of ease. When they are intermitting and located in the back, or commencing there, and extend around the abdomen, they are the most deceptive, because they most resemble true labor pains. They assimilate more closely

the pains of the dilating stage, than those of either the other stages. They differ from the true pains, however, in their being sharper and more cutting than they, and are attended by a dilatation of the os uteri; although this is often a little opened, sufficient to admit of the end of the finger, for two or three weeks, when there is no pain at all. The character of these pains may be determined by passing the finger into the os, so as to touch the membranes, which will be found to remain unchanged, neither increased in their tension, nor pressed forward against the os, more during their presence than in their absence. Nor are they attended with an increased secretion of mucus, or the appearance of "the show." They are purely neuralgic in their character, and amenable to the treatment usually found successful in neuralgia.

SECTION I.—TRUE LABOR PAINS,

Are those that accompany the contractions of the uterus, by which the foetus is expelled, whether at term or not. Though they occur simultaneously with the contractions of labor, they render no assistance whatever, to the process. Labors occasionally occur, and pass regularly through all their stages, and terminate favorably, without a single labor pain being experienced. We once attended a lady in her sixth accouchment, who never felt a labor pain. She described the sensation as a strong bearing-down effort, with an involuntary disposition to strain. Her labors were all speedy and easy. Occasionally the most severe pains attend contractions of the least efficiency. It is a question with some accoucheurs, of great learning and experience, whether the pains of parturition are not rather pathological than physiological. They are undoubtedly due to nervous irritability of the uterus, which results from the artificial mode of living, pertaining to civilized life. The indolence, luxury and dissipation of fashionable circles, and the severe toils, exposures and privations of the poorer classes, tend alike to derange the nervous system and render it irritable and sensitive. These morbid impressions are transmitted from mother to daughter, and perpetuated through succeeding generations, by the continued rounds of the primitive, exciting causes, until but a very few women can be found, who are not the subjects of severe suffering during parturition, from this abnormal condition of the nervous system, the offspring of folly or necessity, accruing from the misdirections of civilized life.

The strength and force of the contractions are *generally* indicated by the severity of the pains. Some nervous, impatient, fretful women, however, make a woe-ful outcry, during the presence of but very slight contractions and moderate pain, while others, of lymphatic temperament, and sluggish sensibilities, endure the most powerful contractions, with but trifling manifestations of suffering. Others again, sensitively organized, but endowed with courage, and remarkable powers of endurance, maintain a most heroic indifference to their suffering, however agonizing they may be, until the close of the struggle. Some are possessed of such extreme sensibility, that causes, which in others would give rise to but slight pain, produce in them extreme tortures; with such, labor presents exhibitions of the most terrific anguish, however much they may try to exercise patience, and preserve due decorum during the trying seasons. Uterine contractions, and consequently the pains of labor, are not wholly independent of the emotions. The presence in the lying-in chamber, of unwelcome persons, the sudden entrance of strangers, and not unfrequently the arrival of the accoucheur, cause a suspension of the process, and often prolong the labor for many hours; and instances are recorded, where such interference has retarded it for several days. Dr. Dewees says that he was once called to attend a lady whose midwife was absent, and the moment he entered the room, her labor pains ceased, and did not re-commence until a fortnight afterwards. He continues: "Every accoucheur has witnessed a temporary suspension of pain on his first appearance in the sick-chamber." Who, that has ever experienced the tortures of the toothache, have not been relieved of their pain by the sight of the dentist? The same mental impressions often operate on the puerperal patient at the sight of the accoucheur. Cases of entire cessation of labor, and fatal termination, from this and similar causes, are reported in the books.

It is held by some, that labor pains are due to the irritable state of the uterus at term, and the resistance to the contractions, offered by the foetus in utero. This may be correct in part, but in whole the explanation is not entirely satisfactory. Abortions in the very earliest stages of pregnancy, are attended with pain, even before the embryo is capable, from its want of solidity, of offering any resistance to the contractions; and the contractions

that follow the birth of the child at term, and the expulsion of the secundines, when the cavity contains nothing to resist them, are attended with pains, known as "after-pains," which continue, when uninterrupted, for several days, and often with great severity. In dysmenorrhœa, the very delicate and unresisting membrane, often formed in that affection, is expelled by contractions, frequently attended with pains of the most violent kind. The pains of parturition, are not, therefore, necessarily the result of a resisting body in the cavity of the uterus. The irritability of the sensor nerves of the organ, whether gravid or not, derived from a similar state of the general sensor nervous system, is undoubtedly, in part, productive of the pains incident to contractions. During the uterine contractions, the fibres in every direction are made shorter, thus diminishing the size of the uterus, by condensing its structure; this condensation causes greater pressure upon the sensor nerves, accompanying those of motion, to which the contraction is due, and which are enveloped in the same sheath, or neurilemma; this pressure causes the sensation of pain. The compression here made, and its effect upon the nerves, are analogous to that experienced in a painful swelling, where the distended tissues press upon the irritated nerves of the part, and produce the pain complained of. The uterus, in dysmenorrhœa, pregnancy, and immediately after delivery, is in a state of irritation, unusual for it, when in a perfectly normal state and unimpregnated; hence the pain that is experienced during contractions, in either of these conditions. In a few days after the birth of the child, and the expulsion of the secundines, at term, and the uterus has been reduced in size, the irritation from pregnancy, augmented by distention, subsides; but the contractions continue, without pain, until the organ becomes reduced to near its primitive size. Thus we have labor ended as it begins, with painless, and undoubtedly persistent, contractions.

SECTION II.—AFTER-PAINS.

As has been already observed, after the woman has enjoyed a respite of a few minutes, from the agonies of parturition, she is again attacked with pains, resembling very much those of labor; they differ from the pains of the expulsive stage, in being less

strong and forcing, but, like those of actual labor, they intermit with periods of ease. The duration of the pains, and the continuance of the intervals between them, are about the same as those of labor. These are known as "after-pains."

Each pain is superinduced by a contraction of the uterine fibres. Before the expulsion of the placenta, its presence is alleged to excite the contractions; and after its removal, they are attributed to the presence of clots, that form in the cavity of the uterus, from the blood that escapes from the uterine vessels, at the part where the placenta was attached, which they cause to be expelled as they form. The contractions, however, continue after coagula ceases to be expelled, which shows that they are not entirely dependent upon the presence of foreign matter, as their exciting cause. It may, nevertheless, be that the lochia, as it gathers in the uterus, may contribute to excite the contractions; but it is evident, that ovarian excitation is the principal excitor to the motor actions of the uterus now, as at the commencement of labor, as the painless contractions continue after the lochia ceases to flow.

The irritability of the uterus is no less instrumental in the production of after-pains, than the pains of dysmenorrhea, abortion, or of normal labor at term.

One peculiarity of "after-pains" is, that they are seldom present with the first labor, and the contractions go on without sensation, affording another striking instance of the painless contractions of the uterus. This is susceptible of explanation only upon the presumption that there is less uterine irritability in the first pregnancy and labor, than afterwards; or, that it subsides upon the birth of the child. The first hypothesis is probably correct, inasmuch as the second labor is followed by "after-pains." So, also, are the next, and each subsequent one; and at each succeeding labor, they become more and more severe, declaring, in the most positive manner, that the uterine irritability increases with each subsequent pregnancy and delivery, after the first. In the contractions, and the causes exciting them, there is no deviation from the first labor to the last, it matters not how many may intervene between them, but the sensations accompanying the contractions increase in severity from the first to the last, be the numbers of labors greater or less.

Notwithstanding, as a general rule, after-pains give no trouble in primiparae; cases occasionally occur that are not exempt from them. In those who have suffered from dysmenorrhœa, and where great irritability attended the ovarian dates, during pregnancy, the first labor is seldom free from the annoyance and sufferings of after-pains. Dr. T. Smith observes that: "As to the seat of the pain, it is partly uterine and partly lumbar, the latter, probably, being dependent upon the ovaria. Sometimes the contractions are not confined to the uterus, but the abdominal muscles become effected, cramps or spasmodic twitchings of the limbs occur, and the pain, which begins in uterine contraction alone, may, by an extension of reflex action, terminate in convulsions."

The foregoing remarks upon after-pains, have been made in relation to their normal manifestation, as they appear in every-day practice, and strictly within the domain of physiology, as it is generally received. They are occasionally met with of such excessive severity, as to place them within the scope of pathological phenomena. In relation to these pathological exhibitions, Dr. Smith further observes: "The main cause of excessive after-pains consists in the excitable condition in which the uterine and ovarian nerves, both as regards reflex action and sensation, are left after parturition. In this stage of excitability, the uterus is roused to contractions by the ovarian stimulus, by the state of the surface from which the placenta has separated, by coagula within the uterus, and by various extra-uterine stimuli. Thus, when the after-pains are excessive, the physiological reflex relations between the breasts and the stomach, and the uterus, excite the most painful action of the latter. The patient can neither drink nor apply the child to the breast without renewing the agonies of labor. Any emotional disturbance aggravates the suffering; the acts of coughing, sneezing, defecation, micturition, or even voluntary movements of the patient in changing her position, etc., produce violent pains, chiefly because of the compression of the uterus by the abdominal muscles. But the uterus is sometimes in such a tetanic state, that the slightest movement of any part of the body excites it to violent spasmodic action."

Irregular spasmodic contractions, after delivery, either at the os, constituting encysted placenta, or at the middle of the uterus, constituting hour-glass contractions, are but irregular and exces-

sive after-pains, induced by the same cause as ordinary ones, but modified in their action by excessive irritation. The necessary treatment of puerperal pains is reserved until we come to consider the management of labor, when it will be introduced, as circumstances indicating it arise.

PART TENTH.

CHAPTER I.

CLASSIFICATION OF LABORS.

IN the phenomenal characteristics of labor, there is almost an infinitude of varieties; no two cases of which can be found exactly alike, in every particular. In duration, they extend from one to over one hundred hours; in severity, they vary from a mere painless uneasiness or discomfort to the most excruciating agony. In their minor details they are no less diversified.

As regards the danger to both mother and child, involved in the process, it may result in no disparagement to the health of either, or in the death of both.

With a view of rendering comfort and assistance to the woman, in the milder forms of labor, and aid and protection in the graver, the presence of the accoucheur is demanded in the parturient chamber.

In order to insure her all the benefit that art and science are capable of affording, in this her greatest extremity, and to shield her against threatening dangers, it behooves the accoucheur to be familiar with all the phenomena of labor, both normal and abnormal, and be prepared to meet any and every emergency that can be met by the resources of his art.

With the design of lightening the labors of the student, and facilitating his advancement in the study of parturition, and its many complications and difficulties, authors have endeavored to divide labors into different groups or classes, assigning to each class a certain variety, so as to include in a few, every possible variation of labor that can be encountered in practice.

The classifications are almost as numerous as are the writers who have attempted the work. While some have aimed at simplicity and utility, others have seemed to vie with each other in rendering the subject complicated and obscure. Dr. Dewees observes that "the classification of labors is altogether arbitrary; scarcely two writers agreeing upon the same arrangement. The object of every classification is to aid the memory by tracing analogies; to establish general rules from which particular ones may be deduced, and for the convenience of description. Now, these ends appear to be answered by almost any division that we may adopt, starting with some general definitions, and making every thing, as far as may be, conform to the generalization. There cannot, therefore, be any one employed which may not be liable, some to more, and others to fewer exceptions. I have carefully considered them all. Some I would reject for their learned parade, without corresponding perspicuity; others, for their complication and the want of harmony in their parts; others, for their multiplied distinctions, without essential differences; and others, for the incorrectness of their definitions, experience being constantly at variance with them."

In order that the student may gain some idea of the various divisions, and the value of their respective merits, we present the following tables of classifications, which we prepare from the various resources that we have been able to command. We prefer to present them in this concentrated form, on account of the convenience of reference and comparison it affords:

Hippocrates admits of two classes. { 1. Natural labors. Where the head presents, and the termination is unassisted.
2. Preternatural labors. Including all other varieties.

Peu, two classes. { 1. Natural. The same as Hippocrates.
2. Laborious. The same as Hippocrates' preternatural labors.

De la Motte, four classes. { 1. Natural.
2. Non-Natural.
3. Preternatural.
4. Untoward.

Soon afterwards were generally admitted three classes. { 1. Natural. All in which the head or breech is presented.
2. Laborious. { Where assistance was necessary from *delay*, with favorable presentations.
3. Preternatural. { Where other parts than the head or breech presented to the strait.

Smellie three classes. {

1. Natural. When the head presents and no extraordinary aid is required.
2. Laborious. { Tedious or lingering labors, where extraordinary force is required, in stretching the parts, or where the forceps or craniotomy is demanded, to save the life of the woman.
3. Preternatural. Where the child is delivered by the breech, knees or feet.

Smellie's division, taught at the same time by Astrue, adopted by Solaries, and propagated by Baudelocque, is still followed by a majority of the French accoucheurs. (*Velpeau*.)

Millot four classes. {

1. Natural. When the head presents.
2. Irregular natural. The child coming breech foremost.
3. Artificial. Where manual or non-cutting instrumental aid is necessary.
4. Preternatural. Where it is necessary to make an artificial passage for the child.

To Millot's division, Gardian adds another class, and calls it mixed labors, when the position of the foetus only requires to be changed.

To the foregoing classifications, various authors have made additional divisions, or given different names.

MM. Maygrier and Gardian, and Madame Boivin, combined preternatural and laborious into one division, and called it *artificial labor*.

M. Capuron denominates labors requiring the use of instruments, *mechanical labors*; and the preternatural labors of Baudelocque he calls *manual labors*.

Denman adds another class, under the title of *anomalous labors*.

Burns has seven divisions, which Velpau says, "comprises every thing," as follows:

Burns seven classes {

1. Natural. Where the head presents favorably, all other things being equal.
2. Premature. Where the birth occurs before term, but the child is viable.
3. Preternatural. Includes all presentations, other than those of natural labor.
4. Tedious. Extending beyond the usual time, but not requiring assistance.
5. Laborious or instrumental. Requiring the use of instruments.
6. Impracticable. When the child, even reduced, cannot pass the straits.
7. Complicated. Attended with some dangerous or troublesome accident or disease.

Mauriceau two classes. {

1. Spontaneous. All labors that terminate by the powers of the organism alone.
2. Difficult. { All labors that require assistance from whatever cause, and without which the life or safety of the mother or child would be endangered.

Baudelocque, four classes.	1. Natural labor, requiring no assistance.	1. Position of the vertex. 2. Position of the feet. 3. Position of the knees. 4. Position of the breech.
	2. Preternatural labors requiring the use of the hand.	1. Faulty positions. 2. Accidents during labor.
	3. Laboring labors, requiring the use of instruments.	1. Faults of the female organs. 2. Monstrosity of the foetus. 3. Want of power of the organs.

MM. Dubois and Desormeaux, Meds.	Boivin and La Cha-	Adopt the division of Baudelocque, classing face presenta-
		tions among natural labors, which he places among faulty positions in his second class.

Dewees adopted Baudelocque's division, with a modification of the arrangement of his first class, as follows: 1, position of the vertex; 2, position of the breech; 3, position of the feet; 4, position of the knees. As this arrangement is most frequently met with in practice, he considers it more natural.

Ramsbotham four classes.	1. Natural. Terminating without assistance, within 24 hours. It admits of no subdivision.	
	2. Is divided into two orders. Lingering and	1. Lingering labors. Head presentation continuing more than 24 hours. No need of instrumental labors. No danger.
		1. Those labors requiring non-cutting instruments, as the forceps and variis.
	3. Preternatural.	2. Instrumental labor. Divided into two varieties.

With 1. Hemorrhage.
— 2. Convulsions.
— 3. Rupture of the uterus.
— 4. Laceration of the vagina.
— 5. Rupture of the bladder.
— 6. Descent of the funis.
— 7. One or both hands with the breech.
— 8. Syncope, unaccompanied with flooding.
— 9. Labors with monsters.
— 10. Labors with a plurality of children.

While the foregoing is the correct classification of the author we cannot vouch for the exact arrangement of the table, nor the phraseology, as we have not the work at hand to enable us to make a verbatim extract.

Velpeau two classes.	1. Eutocia.	1. The vertex. 2. The face. 3. The pelvis.	All labors that terminate spontaneously.
	2. Dystocia.	1. Hemorrhage. 2. Convulsions. 3. Aneurismal. 4. Hernia. 5. With procidentia. 6. From disease of the woman. 7. From narrowness of the pelvis. 8. From wrong positions. 9. From exhaustion, etc.	All labors requiring assistance.

Of all the classifications here given, the latter by Velpeau, has the decided preference, for several reasons. While Hippocrates and Peu, two of the oldest medical writers, and Mauriceau, aimed at brevity and simplicity, in admitting but two classes, the sagacity of Velpeau has improved upon this arrangement, by uniting with it such details as to render it the most comprehensible, practical and perfect division furnished by the records of the obstetrical art. The terms he employs to designate his two divisions, Eutocia and Dystocia, are expressive of just what is required and nothing more. Eutocia, (from *ευ*, "well," and *τοξος*, tokos, to bring forth, *parturition*, *child-birth*), to bring forth well; and Dystocia, (from *Δυσ*, Dys, *difficulty*, *pain*, and *τοξος*, tokos, to bring forth,) to bring forth with pain or difficulty.

Now these terms are vastly more expressive of the idea intended to be conveyed than natural, preternatural, complex, artificial, manual, etc., the vague and indefinite titles employed to designate the different divisions by all the authors cited who have attempted to classify labors. These reasons, if there were no others to offer, would be sufficient to determine which to select from the several classifications presented for adoption in this work.

In giving preference to Velpeau's divisions, that upon which we have practiced, and which has formed the basis of our teachings for the last twenty years, we feel confident that we will save the student much unnecessary trouble, in committing to his memory the necessary classification of labor, and the young practitioner much anxiety in his attempts to refer his cases to their appropriate classes, in order to enable him to pursue the course of treatment indicated, and that the bed-side experience of after life, will ever demonstrate to him the simplicity and practicability of the divisions here recommended to his attention.

CHAPTER II.

EUTOCIA.

EUTOCIA, as we have already learned, implies simple, fortunate, comfortable, spontaneous labor—that which is denominated natural labor by the generality of writers. It also implies a faultless pelvis and a normal state of the soft structures on the part of the woman, a due degree of energy and healthy action of the uterus, a vigorous condition of the general system, and the absence of any accident or untoward circumstance that may seriously interfere with the process of labor.

It implies, on the part of the foetus, a favorable presentation of either the cephalic or pelvic extremity of the body, to the straits of the maternal pelvis, an adaptation of the size of the body to the diameters of the straits; therefore an absence of hydrocephalus, or an abnormal enlargement of the head or body, from any cause whatever, and an absence of monstrosities, such as would destroy the relative proportions between the size of the foetus and the diameters of the straits, and prevent its spontaneous or unassisted delivery.

Were we to institute a numerical comparison between the cases of eutocia and dystocia, the preponderance would be found to be vastly in favor of the former; as, for instance, according to Merriaman, out of 1800 labors, 1746 were essentially cases of eutocia, and but 54 of dystocia. Out of 1897 labors, reported by Dr. Bland, 1860 were eutocial and 37 dystocial. And out of 20,357 labors, at the Maternité at Paris, 20,183 were of eutocia and 174 dystocia, (*Velpeau.*) These three reports will be sufficient to give a general idea of the proportion of the two classes of labors; and all the statistics nearly agree in maintaining a like proportion.

Velpeau treats of eutocia under two divisions, viz.: Natural and Unnatural. What he denominates as natural eutocia, is where the head presents; and unnatural, the breech, feet or knees. The discerning student will here pause to inquire, why the presentation

of one extremity of the body of the foetus is more natural than the other? Does merely the matter of the frequency of occurrence, determine whether it is natural, unnatural, artificial or accidental? Certain it is that the head presents vastly more often than the other extremity of the body; but does that fact alone determine it to be natural, and the other unnatural? If the presentations of the breech, feet or knees are unnatural, pray, what are they, artificial or accidental? Even if they are admitted to be *anomalous*, that only signifies that they are irregular, or deviations from the regular rule; it does not take them without the domain of nature, and place them under the dominion of art, or submit them to the mere casualties of accident. Whether embryo or foetus, it is amenable to the same laws of development and growth, whether the head be upwards or downwards while in *utero*; and, unless the unusual position be the work of art or accident, it must be that of nature, as the entire intro-uterine development and growth are as much the work of nature in one position as the other. We cannot, therefore, admit the division of eutocia, as given by Velpau, because it is not scientifically correct, nor is it expressive of the existing conditions.

Eutocia, however, very properly admits of a division, and without which it would be difficult to present it clearly to the mind of the reader. For the division of Velpau we substitute our own, viz.: 1. Cephalic eutocia; and 2, Pelvic eutocia; including feet and knees, as being expressive of the only two positions in which a labor at term can terminate spontaneously, except under very extraordinary circumstances.

We do not desire it to be understood that assistance should never be rendered in eutocial labors, by any means, for directly the reverse is often indicated. Labors that are susceptible of spontaneous termination, and which in time would so terminate, without hazard to either mother or child, may often be greatly facilitated, and much suffering and time saved by the timely application of appropriate *manual* assistance. This admission is not, however, to be construed into a license for unjustifiable and indiscriminate interference with the normal process; nor as a warrant to justify taking the work out of the hands of nature and accomplishing it by artificial or instrumental means; but as a suggestion that, in any of the various presentations hereafter to be considered,

which may be classed under this general head, proper *assistance*, timely applied, may be of decided advantage. Indeed, there are but few labors where the presence of the accoucheur is at all needed, that may not be assisted in some way or other, to a greater or less extent. And the fact that his presence is required, presupposed that such assistance is desired and expected on the part of the patient and her friends, and it should not be withheld, either from ignorance or indifference, but extended with discretion and judgment.

SECTION I.—CEPHALIC EUTOCIA.

A comparison instituted between cephalic and pelvic eutocia, would show a very great proportion in favor of the former. Out of 37,895 eutocial labors, by Madame La Chapell, 837 were breech, 538 feet, and 4 knee presentations, or 1379 cases of pelvic, leaving 36,516 of cephalic eutocia. Out of 20,517 eutocial labors, by Madame Boivin, there were 707 pelvic and other presentations, leaving 19,810 cephalic, (*Velpeau.*) Out of 12,531 eutocial labors, which occurred at *l'Hospice de la Maternité* in Paris, from December 10th, 1797, to July 31st, 1806, inclusive, there were 348 cases of pelvic eutocia, leaving 12,183 cephalic. (*Burnes.*)

The chief statistics of labor that constitute the data for obstetrical calculations at the present time, were collected about the close of the last and the commencement of the present century. As they are a material—the value of which is neither augmented nor deteriorated by time—they are just as good for the purpose to which they are applied now, as they were half a century ago, or if they had been collected yesterday. They do not get out of date from time, but remain as reliable now as when first promulgated. The foregoing estimates, therefore, of the proportion of eutocial and dystocial labors, and cephalic and pelvic eutocia, may be relied upon, as fair specimens of the general results of labors at the present time throughout the world.

SECTION II.—CEPHALIC PRESENTATIONS.

Out of 48,345 labors, reported by Merriman, Bland, Madame Boivin, Madame La Chapell, Naegèle and Lovati, 40,394

were cephalic or head presentations. What is meant here by presentation, is the part of the body of the foetus presenting to the superior strait, or inlet of the pelvis. This exhibition shows the vastness of the preponderance of labors in which the head so presents. The presentations will be considered in the order of the frequency of their occurrence. As the head then is so much the more frequent to present, it is the first to be considered; or, in other words, cephalic eutocia will receive the first consideration, because its occurrence is the rule in labors, to which all other presentations only form exceptions.

The head does not always present to the strait in the same way, *i.e.*, the same parts of the head do not always present to the same points of the pelvis. Sometimes from a vicious position of the head, the face is first to present. Hence, head presentations are divided into two classes: 1, cranial; 2, facial.

SECTION III.—CRANIAL PRESENTATIONS.

Out of 47,012 head presentations reported, 46,769 were cranial—the frequency of occurrence clearly constituting cranial presentations the rule in cephalic eutocial labors, while deviations from it form the exception. Such being the case, cranial presentations will be first to be considered. The cranium even, does not always present in the same way, or rather the same parts of the cranium do not always present to the same points of the pelvis.

The next question, then, is what part of the cranium presents the most frequently to a given point in the pelvis? This ascertained will constitute the first presentation, because it occurs more frequently than any other presentation of the head.

The vertex, or crown of the head, is first to present, and the left acetabulum is the point to which it most frequently presents, (Fig. 84). Out of 42,877 cranial presentations reported, 31,538 were with the vertex to the left acetabulum, leaving 11,339 for other presentations of the cranium. The vertex to the left acetabulum, then, being by far the most frequent, constitutes the *first* head presentation. There are two parts of the cranium, either of which may present at the superior strait; they are the vertex and fore-

head, and are distinguished by the posterior and anterior fontanelles; these, being more easily detected, while the head is at the inlet, than the other portions of the cranium, have been chosen as the distinguishing points, by which the presentations are determined.

There are four points of the brim of the pelvis, at which either of the parts of the cranium just mentioned may present. These points, with the presenting parts of the cranium, form the basis of the numerical order of the presentations. There are, therefore, six cranial presentations, arranged according to the frequency of their occurrence. The points of the pelvis, at which either part of the cranium may present, are as follows: 1, The left acetabulum; 2, the right acetabulum; 3, the symphysis of the pubis; 4, the promontory of the sacrum. The six cranial presentations are so arranged that they can be easily remembered, if studied in a systematic order. The first three are distinguished, on the part of the cranium, by the posterior fontanel; and the three last by the anterior fontanel.

As the acetabula are found upon the outside of the pelvis, and the foetal head occupies the inside, the fontanelles must of necessity present opposite to the acetabula, or, what is the same thing, behind them.

In the first two presentations, in which the head is placed diagonally across the pelvis, the anterior fontanel will be at the sacro-iliac symphysis, opposite to the acetabulum, behind which the posterior presents, and *vice versa*, as regards the fourth and fifth presentations. The fontanelles are found at opposite points of the pelvis, in all the presentations. The cranial presentations are arranged as follows:

1. The posterior fontanel behind the left acetabulum, and the anterior fontanel to the right sacro-iliac symphysis.
2. The posterior fontanel behind the right acetabulum, and the anterior fontanel to the left sacro-iliac symphysis.
3. The posterior fontanel behind the symphysis pubis, and the anterior fontanel to the promontory of the sacrum.

The fourth, fifth, and sixth presentations are a repetition of the foregoing, only the anterior fontanel presents instead of the posterior.

4. The anterior fontanel behind the left acetabulum, and the posterior fontanel to the right sacro-iliac symphysis.

5. The anterior fontanel behind the right acetabulum, and the posterior fontanel to the left sacro-iliac symphysis.

6. The anterior fontanel behind the symphysis pubis, and the posterior fontanel to the promontory of the sacrum.

This arrangement of the presentations of the cranium, is that of Boudelocque, modified by Dewees. It is certainly the most simple, practical and easily comprehended of any of the various arrangements that have been presented by different obstetrical writers. As brevity, simplicity, and comprehensibility are always preferable to complexity and obscurity, we feel that we are conferring upon the student a favor of no small magnitude, in adopting the foregoing for his study; to the various phases, advantages and disadvantages of which we invite his especial and earnest attention.

Every accoucheur can testify to the necessity and importance of a thorough comprehension of the different presentations, and the peculiar mechanism of each, in view of their practical bearing, at the bed-side of the patient. These constitute the alphabet of the practice of obstetrics. When thoroughly understood, the mind is relieved of much anxiety and perplexity, when engaged with a difficult case, that would otherwise be tortured by uncertainty and harassed by apprehensions of every real and imaginary danger, by which the obstetrical practice is beset.

While a good theoretical knowledge can be obtained from books, and demonstrations in the lecture-room, the only means of acquiring perfection in the art of diagnosis, can be found in bed-side experience. As a degree of preparation is necessary for such experience, the young aspirant for obstetrical renown cannot acquire too great perfection in this elementary department of his art. Even if he should fail, which he will be very likely to do in his first few cases, in detecting the distinguishing marks of the cranium, viz.: the fontanels, and thus be unable to make a diagnosis, he should not be discouraged, but remember the probabilities are very strong that the child will be born in due time, whether he is able to ascertain the true position of the head or not. This is the experience of every young practitioner; even those who have become illustrious, and shed glory upon their art

by their superior acquirements and skill, have passed through the same unsatisfactory initiatory ceremonies.

It often requires more ingenuity to find different expressions for one plain fact, than to invent theories or form systems. Such appears to be the case, in a preëminent degree, in regard to the subject under consideration. The matter of foetal presentations is one of fact, the description of which should always be expressed in as few and plain words as is consistent with perspicuity. Such is the object we have in view in adopting the plain and comprehensible description of the presentations given by Baudelocque and Dewees. It is clothed in none of the unnecessary verbiage, nor obscured by the ostentatious display that characterize many of the descriptions given by other authors.

For the purpose of enlightening the student in regard to the arrangements of different writers, and for future reference, we here give a number of tables, showing the different forms of expression given to represent nearly the same thing in regard to cranial presentations; and we design pursuing the same course in reference to the others.

Baudelocque gives six cranial presentations.

Vertex.	$\left\{ \begin{array}{l} 1. \text{ Occiput behind the left acetabulum.} \\ 2. \text{ Occiput behind the right acetabulum.} \\ 3. \text{ Occiput behind the symphysis pubis.} \\ 4. \text{ Occiput before the right sacro-iliac symphysis.} \\ 5. \text{ Occiput before the left sacro-iliac symphysis.} \\ 6. \text{ Occiput before the sacrum.} \end{array} \right.$
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Gardiner. The same as Baudelocque.

Maygrier gives four cranial presentations.

Vertex.	$\left\{ \begin{array}{l} 1. \text{ Left occipito-cotyloid.} \\ 2. \text{ Right occipito-cotyloid.} \\ 3. \text{ Right occipito-sacro-iliac.} \\ 4. \text{ Left occipito-sacro-iliac.} \end{array} \right.$
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Capuron gives four.

Vertex.	$\left\{ \begin{array}{l} 1. \text{ Left occipito-anterior.} \\ 2. \text{ Right occipito-anterior.} \\ 3. \text{ Right occipito-posterior.} \\ 4. \text{ Left occipito-posterior.} \end{array} \right.$
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Madame Boivin. Same as Baudelocque.

Madame La Chapell.

Vertex.	$\left\{ \begin{array}{l} 1. \text{ As Baudelocque.} \\ 2. \text{ Idem.} \\ 3. \text{ The 4th. Of Baudelocque.} \\ 4. \text{ The 5th. Of Baudelocque.} \\ 5. \text{ Occiput to the left.} \\ 6. \text{ Occiput to the right.} \end{array} \right.$
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Plamant gives eight cranial presentations.

Vertex. { 1. Occipital fontanel above the left acetabulum.
 2. Occipital fontanel above the right acetabulum.
 3. Occipital fontanel above the symphysis pubis.
 4. Occipital fontanel above the right sacro-iliac symphysis.
 5. Occipital fontanel above the left sacro-iliac symphysis.
 6. Occipital fontanel above the sacro-vertebral angle.
 7. Occipital fontanel above the left iliac fossa.
 8. Occipital fontanel above the right iliac fossa.

Dugès gives four, like Maygrier and Capuron; and Dubois and Desormeaux adopt Baudelocque's.

Velpeau gives two species.

Head.	1. Occip. ant. three varieties. 2. Occip. Post. three varieties.	1. Left occip. acet. 2. Right occip. acet. 3. Occip. pubic. 1. Left fronto-acet. 2. Right fronto-acet. 3. Fronto-pubic.
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Some American teachers follow the arrangement of Prof. Moreau, and make a distinction between presentations and positions. For instance, the cephalic or head presentations are regarded as but one, which is divided into three genera : 1st genus, the vertex presentation ; 2d genus, face presentation ; 3d genus, presentation of the sides of the head, sub-divided into right and left sides. We here give his sub-divisions of the first genus or vertex presentation :

First genus Vertex presentation.	{ <table border="0" style="width: 100%;"> <tr> <td style="width: 30%;">1st position.—Left occipito-ilium.</td><td style="width: 70%; text-align: right;">Anterior. Transverse. Posterior.</td></tr> <tr> <td>2d position.—Right occipito-ilium.</td><td style="text-align: right;">Anterior. Transverse. Posterior.</td></tr> <tr> <td>3d position.—Occipito-pubic.</td><td></td></tr> <tr> <td>4th position.—Occipito-sacral.</td><td></td></tr> </table>	1st position.—Left occipito-ilium.	Anterior. Transverse. Posterior.	2d position.—Right occipito-ilium.	Anterior. Transverse. Posterior.	3d position.—Occipito-pubic.		4th position.—Occipito-sacral.	
1st position.—Left occipito-ilium.	Anterior. Transverse. Posterior.								
2d position.—Right occipito-ilium.	Anterior. Transverse. Posterior.								
3d position.—Occipito-pubic.									
4th position.—Occipito-sacral.									

In this arrangement two of the presentations of Baudelocque, or positions, according to Moreau, which occur very much more frequently than the third and fourth positions here given, are entirely omitted, which leaves the system incomplete. And the distinction he makes between presentations and positions and his sub-divisions, make no difference in regard to the facts, but tend to complicate the matter and render it more obscure. Though it is a more recent arrangement than that of Baudelocque by Dewees, it is vastly inferior to it in point of utility and perspecuity, according to our notion.

SECTION IV.—THE FIRST PRESENTATION, AND ITS MECHANISM.

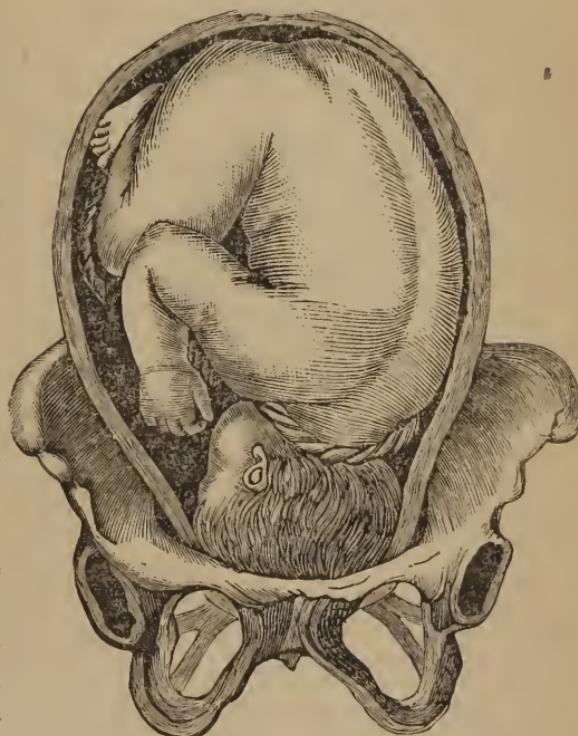
The posterior fontanel behind the left acetabulum, with the anterior fontanel at the right sacro-iliac symphysis, and the sagit-

tal suture traversing the oblique diameter of the superior strait, from the right to the left.

This occurs 31,538 times in 42,877 cases of cephalic eutocia.

From what has already been said, in reference to the position of the foetus in utero, it must be expected that labor will find the foetal head occupying the inferior segment of the uterus. We have a right to expect this, as we have shown by statistics, head presentations constitute the *rule* in labors, and the comparative few deviations from it the exception. Now we have a right to expect an adherence to the rule in this instance, as in any other of the processes of nature, and admit the exception, only when its presence is manifested. Why the THE FIRST VERTEX, OF LEFT OCCIPITO-ACETABULAR PRESENTATION.

FIG. 84.



position, with its head downwards, and the pelvic extremity of the trunk occupying the superior portion, or fundus of the uterus, we have endeavored to explain in a preceding article. But why the dorsal surface of the foetal body should, in such a very large majority of cases, be found towards the left side of the mother, with the occiput behind the acetabulum of that side, admits of further inquiry. Velpeau suggests that the circumstance is due to the presence of the rectum, which is situated on the left side of the median line of the sacrum, and often being loaded with hard faeces, forces the head round, so that the sagittal suture traverses the diagonal or oblique diameter of the pelvis from the

acetabulum on the left, to the sacro-iliac symphysis on the right side. This view is also maintained by Cazeaux. At a superficial glance, it may appear plausible ; but upon a closer examination, its fallacy becomes apparent. The presence of the rectum upon the left side may, and undoubtedly does, oblige the uterus, with its contents, to incline to the right side, as it rises out of the pelvis, at about the fourth month of gestation, and continue it in that inclination during the remainder of the term. And here the interference of the rectum, with the phenomena of gestation, ceases. The fact is, early in pregnancy, as early as the third month, while the uterus occupies the cavity of the pelvis, and the uterine walls retain a good degree of tensity, the foetus is found with its dorsum to the left side of the uterus, when the latter occupies a position that can be but slightly affected by presence of the rectum, and its walls too dense to permit of any impression being made upon its contents, from the slight contact it may maintain with the rectum. Any pressure that can effect the position of the foetus, within the uterus, must necessarily produce a corresponding indentation upon its external surface ; because the uterine walls intervening between the source of the force, and the body effected, must first receive the impression. No such impression or indentation is observable on the exterior of the uterus, at any period of pregnancy. While we do not attempt a solution of the problem, we object to the one already offered, as too mechanical to be accepted, without more evidence of its accuracy, notwithstanding Dugès' inferential observation, from having "seen the foetus in Baudelocque's second position, in two women, who had the rectum on the right side." This circumstance can be only co-incidental, as the second position would uniformly obtain in the same woman, if the position of the rectum determined that of the foetus. Where is the accoucheur of any experience, who has not met with both the first and second presentation in the same woman, in different labors ? Neither can we accept the metaphysical explanation of Dubois, who "considers this position as the consequence of an instinctive determination of the foetus itself." We would rather refer it to that unexplored arcana of nature, whence emanate all her unexplained operations, and wait for some future genius to unravel the mystery.

Authors ascribe four motions to the head, during the process of labor, 1, flexion; 2, rotation; 3, extension; 4, restitution.

This arrangement has always appeared to us to be distinguished more for prolixity than utility.

1. *Flexion.*- This refers to the relative position of the head, with reference to the chin and breast. During the whole period of gestation, even in the embryonic stage, the embryo will always be found with the chin strongly inclined towards the breast; as gestation proceeds, and the foetus acquires greater size, this inclination is observed to increase, and at the close of the term the chin is found in contact with the breast. Now it is possible that during labor, the contractions of the uterus acting upon the body of the foetus during the propulsive stage, and the head being resisted at the superior strait by the os uteri and other structures, may cause a closer contact between the chin and breast, or a somewhat greater degree of flexion, but not sufficient, in our estimation, to constitute it one of the motions of labor. Flexion, then, is really a position of gestation, and not absolutely a motion of labor; as the former, we accept it, because it is true; as the latter, we reject it, because it is false.

Restitution. This is described by the older writers, as the last movement of the head during labor, and is retained in some of the more modern books, but shorn of much of its supposed importance, from the fact that more recent investigations have demonstrated that it does not exist. It was supposed that the rotary motion of the head in the cavity of the pelvis, was due entirely to a twist or tortion of the neck, and that the shoulders remained stationary at the superior strait, and that as soon as the head escaped from the vulva, and the face turned towards the inner surface of the right thigh, the twist in the neck was removed, and the head restored to its natural position with the body; hence the term *restitution*.

Now, as it has been demonstrated by M. Gurdy, and observed by others, that the rotation of the head in the pelvic cavity is subordinate to the motion of the trunk; that the shoulders when they first present to the superior strait, their bis-acromial diameter, is in the direction of the oblique diameter of the strait; that is, the right shoulder is at about the ilio-pubic junction of the brim on the right side, and the left at the sacro-iliac symphysis on the left side; but as the head descends, and the shoulders engage in the strait, they do so nearly in its transverse diameter, thus requiring a rotation of the trunk. This rotation, and that of the head, occurs simultaneously, so there

is no twist in the neck, and no departure of the face from its correspondence with the anterior plane of the trunk; no derangement in the natural position of the head with the body—nothing to be restored; hence no *restitution*, and no existence of such a motion.

These two imaginary motions—flexion and restitution—the first, being a condition of gestation only, and not induced by labor; and the second, being entirely theoretical, having no existence in fact, are rejected, and only two retained for study, viz.: rotation and extension, as being the only real motions of the head, incident to labor.

Rotation. As has already been premised, the head of the foetus, at the commencement of actual labor, before the rupture of the membranes, occupies, with its occipito-frontal or antero-posterior diameter, the oblique diameter of the superior strait. The foetal body receiving the whole influence of the contraction of the longitudinal and circular-uterine fibres, is maintained in the direction of the axis of the uterus and superior strait by the latter, and after the dilatation of the os uteri, and the rupturing of the membranes, the head enters and is propelled through the strait, by the former. Upon entering the cavity of the pelvis, the two lateral portions of which, by the soft structures occupying and lining them, form two inclined planes, which diverge from below upwards, where they form the lateral boundaries of the inferior strait, and bound laterally the superior strait, the head in passing down these inclined planes, with its occipito-frontal diameter laterally, meets with resistance, which increases as it descends, until, as it approaches the floor of the pelvis, it is forced round the occiput, passing from the left towards the right, so that the occipito-frontal diameter, is brought in the direction of the antero-posterior, or long diameter of the inferior strait, with the occiput at the symphysis pubis, and the face in the hollow of the sacrum. Simultaneously with this movement of the head, the shoulders also rotate, so as to traverse nearly the transverse diameter of the superior strait, the left shoulder leaving the left sacro-iliac symphysis, and moving anteriorly towards nearly the middle of the linea-ilio-peccinea, while the right shoulder leaves the ilio-pubic junction on the right side, and moves posteriorly towards the same point in the linea-ilio-peccinca on the right side. In this way the shoulder and the trunk rotate with the head, all describing the segment of about one-fourth or one-sixth of a circle.

Thus it will be seen that the rotation of the head is effected without causing any twist or tortion in the neck whatever, and that its natural position with the trunk is not disturbed in the least. As a matter of accuracy it should be observed that the shoulders, in changing their position, do not conform exactly with the transverse diameter of the superior strait, but remain very slightly oblique, and so enter the brim.

Extension. After the completion of the rotary motion, and the diameters of the head have become arranged in the most favorable position for its expulsion, that is, with its long or occipito-frontal diameter corresponding with the long or antero-posterior diameter of the inferior strait, and the short or bi-parietal diameter corresponding with the short or transverse diameter of the strait; and the fibres of the uterus somewhat relieved of their tension, by the partial displacement of the foetus, from its cavity, the contractile force of the organ is applied to the body of the foetus with renewed vigor, to effect its expulsion. In the accomplishment of this, the head is now pressed downward and forward in the direction of the axis of the inferior strait; the apex approaches the vulva, and separates the labia, while the occiput engages under the arch of the pubis, by the action of a violent expulsive contraction of the uterus, the head is forced through the external organs; at this instant, the chin, which, during the whole of the labor, was inclined upon the upper section of the breast, suddenly leaves it, and the face sweeps the hollow of the sacrum; the chin being the last to leave the anterior margin of the perineum, which, during the passage of the head, is enormously distended and prolonged. As the face sweeps the posterior boundary of this portion of the genital canal, the occiput is observed to mount upon the mons veneris; the inferior margin of the pubis acting as a fulcrum, against which the neck rests, while the head performs its extension, and the occiput is thrown upon the mons veneris. In doing this, the head performs about one-fourth of a circle backwards.

Mechanism. As nearly all the phenomena of the mechanism of the first presentation of labor have been anticipated, fragmentarily, while discussing the motions of the head, there remains to be done but little more than present a summary of what has already been said, and make a few additional remarks on the delivery of the body.

There are some very finely spun theories in regard to the motions

of the head, and its exact relative positions with the different points of the pelvis, involved in the mechanism of labor, which could be of very little practical utility, even were they strictly correct; but as there is considerable disagreement in reference to them, amongst some of the most distinguished authors, their entire accuracy is left in some degree of doubt. Then, as they are of but little benefit, practically, and not conclusive theoretically, we will refrain from intruding them upon the attention of the student, to the exclusion, perhaps, of more important matters. To those, however, who feel curious to examine them, we would recommend the works of Dubois, Cazeaux, etc.

The course pursued by the foetus, in making its exit from the cavity of the uterus, through the straits of the pelvis and external organs to the outer world, is as follows:

1. The head is found at the superior strait, with the posterior fontanel behind the left acetabulum, with the sagittal suture traversing the strait obliquely towards the sacro-iliac symphysis of the right side, and the membranes entire, as this occurs during the stage of dilatation. The part of the head most pendent, at this stage of the labor, and the one with which the finger comes in contact in making the vaginal examination, is the parietal protuberance of the right side. The pelvis being placed obliquely to the axis of the trunk, the head enters it perpendicularly to the plane of the superior strait, or in the direction with its axis, which accords with that of the long diameter of the uterus. This position brings the right parietal protuberance nearer the symphysis pubis, and more accessible to the finger, than any other part of the head; and the finger, in passing into the vagina, and up to the strait, nearly parallel to its axis, comes first in contact with the head at that point, the occipito-frontal circumference being on a plane corresponding to that of the brim.

2. Upon the rupturing of the membranes, either spontaneously or mechanically, at the commencement of the stage of propulsion, a portion of the liquor amnii escapes, which brings the contracting uterus nearer in contact with some portions of the foetal body, and actually so with other portions, as the irregular points and uneven projections presented by the folding joints, the limbs, etc. The contractions now increase in force and efficiency, and act more powerfully on the body of the foetus, and especially the spinal column, upon which the whole force of the uterine effort is ex-

pended, and by which it is supported. It is to the superior solidity and resistance of the spine, that the proper shape and position of the foetus is due during parturition; and it is through this column that the influence of the uterine contractions are maintained towards the other and more yielding parts of the body. It is in consequence of the direct connection of the head with the spinal column at the occipito-cervical articulation, that it is capable of being propelled through the upper, and expelled through the lower straits in the manner it is. The force of the uterus, then, during its contractions, being applied to the head, through the medium of the spinal column, presses it down through the superior strait nearly, if not quite, in the direction in which it entered it, viz.: that of its oblique diameter. During its occupancy of the cavity of the pelvis, into which it passes from the upper strait, it rotates, as already described, and the occiput, *passing from left to right*, is brought to the symphysis pubis, and the face made to occupy the hollow of the sacrum; and the shoulders placed nearly transversely with the superior strait.

3. The head now being placed in a position most favorable for its expulsion, viz.: with its long or occipito-frontal diameter in correspondence with the long diameter of the inferior strait, and the shoulders ready to engage in the brim of the pelvis, we have announced the arrival of the stage of expulsion, that which is to consummate the birth of the child. At this point, the waters having been nearly all or quite discharged, and the uterine fibres measurably relaxed by the partial displacement of the foetus and the escape of the liquor amnii, the uterus is prepared to make its most forcible and decisive contractions, during which the occiput passes from under the arch of the pubes and rises upon the mons veneris; the face, at the same time, sweeping the hollow of the sacrum and perineum, and the head is born.

4. After a few seconds' respite, the uterus again gathers itself for another encounter, when the shoulders are forced through the superior strait into the cavity, where, like the head, they rotate, but in an opposite direction, the right one passing from right to left until it arrives under the arch of the pubes, and the left in the hollow of the sacrum; by this movement, the face is turned towards the right thigh, their bis-acromial diameter now being in direction of the long diameter of the inferior strait; the right shoulder escapes from under the arch of the pubis, and is first to

present itself at the vulva; but the left, after traversing the floor of the pelvis, escapes almost simultaneously. The shoulders now delivered, the body is slightly curved laterally during its passage through the straits, to accommodate itself to the two axes of the pelvis, the inner or short curve being upon the right side, as it passes under the arch of the pubis, and the outer or long one on the left as it traverses the hollow of the sacrum and the perineum. The pelvis passes the same as the shoulders, and is followed immediately by the lower extremities, which last act terminates the process. After the escape of the head, but one contraction is generally necessary to expel the shoulders, trunk and lower extremities. The descent of the shoulders through the superior strait, their rotation in the cavity, and their final expulsion, and that of the body and extremities, are all accomplished in a very short time, and by one uterine effort.

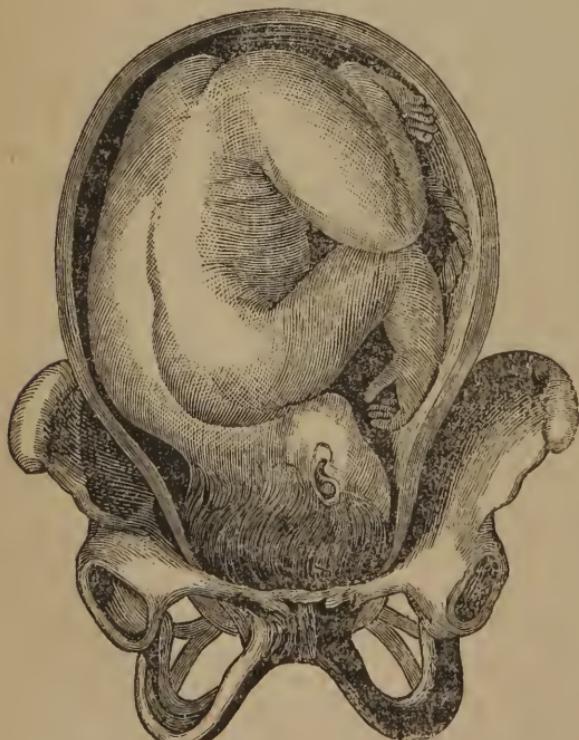
SECTION V.—THE SECOND PRESENTATION, AND ITS MECHANISM.

This presentation occurred 8,341 times in 42,799 cases of cephalic eutocia. It differs from the first only in

the fact that the posterior fontanel presents behind the right acetabulum, instead of the left, in which case the sagittal suture traverses the oblique diameter of the pelvis in an opposite direction from that of the first presentation, it being from the right acetabulum to the left sacro-iliac symphysis.

The Mechanism of this presentation is the same as that of the first, only the head and shoulders rotate in an opposite direc-

FIG. 85.



SECOND VERTEX, OR RIGHT OCCIPITO-ACETABULAR PRESENTATION.

tion, it being from right to left, instead of from left to right, as in the first. After the rotation is complete, the mechanism continues the same as the first during the remainder of the labor.

This presentation is uniformly attended with more tardy labors than the first, from which circumstance it is considered less favorable; this results undoubtedly from the rectum being on the left side of the sacrum. During the rotation of the head, the anterior portion of it, as the forehead and face, in its movement from right to left, meets with a resistance from the rectum; this resistance is greater in proportion to the quantity of faeces it contains. Various explanations have been given of the tardiness of these labors, and the difficulty attending the rotation of the head, all of which are more or less unsatisfactory, except the one here given, which is fully sustained by our own observations.

SECTION VI.—THIRD PRESENTATION, AND ITS MECHANISM.

This presentation consists of the posterior fontanel behind the symphysis pubes, and the anterior one at the promontory of the sacrum, and the sagittal suture traversing the superior strait antero-posteriorly. It occurred but six times in 20,517 instances of cephalic eutocia, as reported by Madame Boivin. Since Baudelocque introduced it—rather to complete his plan, as it is alleged, than from his own observation, or the testimony of his senses—it has been continued to be described by some authors, as MM. Gardien, Dubois, Flamant, Dewees, Desormeaux, Madame Boivin, etc., all of whom admit its very rare occurrence, while it has been rejected by MM. Maygrier, Capuron, etc.; and Madame La Chapell affirms that she never met with one instance of it in more than 36,000 labors. Velpeau admits the possibility of such a presentation.

The Mechanism, where it is present, and the head is not diverted from the centre of the pelvis by any vicious position of the uterus, as the right, left, or anterior obliquity, and where a proper relation exists between the size of the head and the antero-posterior diameter of the superior strait, this presentation presents less difficulty than either of the previous ones, because the head enters the pelvis with its occipito-frontal or long diameter in the direction of the long or antero-posterior diameter of the inferior strait, in which case the necessity for the rotary motion does not exist, but the

head descends immediately from the upper to the lower strait, and the shoulders engage in the inlet in the direction of its transverse diameter; after which the labor terminates by the same mechanism, as is observed in the two previous presentations, either the right or left shoulder presenting under the arch of the pubes.

But should there be a disparity between the dimensions of the head and the conjugate diameter of the inlet; should the former be large and the latter be contracted, or even of the medium length, the head would experience great difficulty in engaging in the strait, because of the disproportion of the two diameters. In this case, it would be necessary to change the position of the head, by placing one or two fingers upon one side or the other of the presenting part, and in the absence of pain, push it either to the left or right side, so that the posterior fontanel may be placed behind either the left or right acetabulum, thus converting the presentation into the first or second, as may be found most convenient. After this new position has been gained, it should be maintained by continuing the fingers, with a moderate degree of pressure, on the side of the head during three or four contractions, until it becomes engaged in the strait. The mechanism will then be the same as the presentation into which it has been converted.

As Velpeau truly remarks, these three presentations are but shades of each other, the prominent features of the labor being the same in each: 1. The chin remains strongly flexed upon the breast in them all, which flexion only terminates by the extension of the head after birth. 2. In each case the occiput traverses the same distance, about two or two and a half inches, before it reaches the arch of the pubes. 3. In all three presentations the vertex is the most pendent part, and the first to escape from the vulva. 4. And, *per se*, they are alike void of difficulty or danger.

SECTION VII.—FOURTH PRESENTATION, AND ITS MECHANISM.

This presentation is where the *anterior* fontanel presents to the left acetabulum, and the posterior to the right sacro-iliac symphysis, and the sagittal suture traverses the superior strait diagonally from left to right. It occurred but two hundred and forty-three times in forty-two thousand seven hundred and sixty instances of cephalic eutocia. It is the most common of the three presentations in-

dicated by the anterior fontanel; it unites all the favorable conditions of the three, and in this respect is the most favorable of them all. In the fourth presentation, like the second the dorsum of the foetus is to the right side of the woman, and the facial and ventral aspect to the left. In the second presentation, the back of the foetus inclines forward in the right side, while the front part inclines backward in the left; while

THE FOURTH VERTEX, OR LEFT FRONTO-ACETABULAR PRESENTATION.

in the fourth, we have the dorsal surface of the foetus inclining to the back in the right side while the abdominal aspect inclines forward in the left.

The Mechanism. In this presentation, the chin is flexed on the breast, and the vertex is the most pendent part, as in the three former ones. The head enters the superior strait, like in the first and second, with its occipito-frontal diameter diagonally with the superior strait. And thus far, there are no disadvantages resulting from this particular position that are not experienced in the first and second presentations. Nor is there any especial disadvantage or delay, with reference to the rotation of the head, which is effected by the forehead passing from the left to the right. But after the head is placed with its long diameter in this direction, with the long diameter with the inferior strait, with the forehead at the pubis, and the occiput in the hollow of the sacrum—a reversed position from that of this stage of the labor in either of the three

FIG. 86.



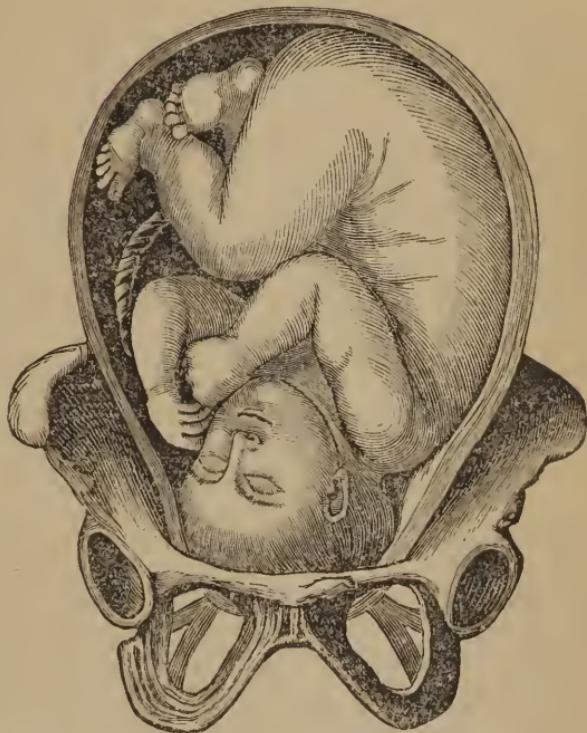
preceding presentations—we have presented a series of difficulties and delays not before encountered, and not common to either of the three first presentations. The broad, resisting forehead, being but illly adapted to the arch of the pubes, enters beneath it with great difficulty, the forehead is resisted by the pubico-ischiatic rami on both sides, with which its low corners come in contact; and its square, broad surface, as it passes beneath the arch, remains from a half to three-quarters of an inch below its apex, making that much increase in the length of the conjugate diameter of the outlet necessary, in the posterior direction. The forehead cannot pass beneath the arch in any other way than by its being so far depressed as to allow it to pass between the rami, at a great distance from the apex of the arch, where they are of sufficient distance apart to admit of its passage.

While the forehead is being depressed, the occiput is being forced back to the same extent, and having traversed the hollow of the sacrum, finds in the yielding structures of the perineum space sufficient to admit of its advancement towards the posterior commissure of the vulva, where the vertex presents itself and escapes, before the forehead becomes disengaged from under the arch of the pubes. During this process, the chin remains strongly flexed upon the breast, and the forehead, being fixed at the pubic arch, cannot advance; the occiput is pushed forward along the posterior curve of the passage, so that when at the vulva, it is in advance of the forehead, and the neck and shoulders, to a great extent occupy the hollow of the sacrum and cavity of the pelvis. The long distance swept by the occiput in traversing the sacral cavity and perineum, and the great disadvantage, under which the uterus labors, from the extreme flexion of the body, in applying the force of its contractions to the head, during the process, render the labors in these anterior presentations very protracted and painfully laborious and exhausting. After the head is delivered, the occiput escaping over the anterior edge of the perineum, and the face from under the arch of the pubes; the external rotation of the head soon follows its birth, as in the preceding presentations, the face almost always turning to the left thigh; the shoulders, at the same time rotating within the pelvis, the left coming under the arch of the pubes, and the right occupying the hollow of the sacrum. The shoulders and body are now delivered as in the preceding presentations.

SECTION VIII.—FIFTH PRESENTATION, AND ITS MECHANISM.

The fifth presentation is distinguished by the anterior fontanel behind the right acetabulum, and the posterior at the left sacro-iliac symphysis, with the sagittal suture traversing the superior strait obliquely from the right to left. This presentation occurred 158 times in 42,760 instances of cephalic eutocia. The back of the foetus is here found to the left side of the woman, towards the spine, while the abdomen is to the right and inclined front.

FIG. 87.



FIFTH VERTEX, OR RIGHT FRONTO-ACETABULAR PRESENTATION.

The Mechanism. The same difficulty attends the passage of the head through the inferior strait in this presentation, as obtains in the last, as the forehead passes under the arch of the pubes in the same manner. The head in this instance rotates from the right to the left instead of from the left to the right, as in the fourth presentation. The labor is more protracted than in the last; this occurs from the same cause that protracts it in the second, viz.: the difficulty encountered by the head, in rotating, from the presence of the rectum on the left side of the sacrum. Here we have a combination of circumstances that renders the labor, in this presentation, the most protracted and difficult of any of the preceding ones.

After the head engages in the inferior strait, with the forehead under the arch of the pubes, and the occiput traversing the coccyx and the perineum, it encounters the same difficulties as are experienced in the fourth presentation. After the head is born, it rotates with the face in the same direction as in the fourth. The spontaneous rotations of the head frequently convert this presentation into the first and the fourth into the second. There is no experienced accoucheur who has not witnessed during the touch these spontaneous rotations from one point to another, and then reversed again, and this repeated two or three times during a labor; or in fact, until the head becomes too firmly engaged to admit of a rotary motion.

In view of the boundless resources of nature, and her ability to correct or overcome difficulties incident to parturition, the advice given by Denman, and quoted by Dewees, should be borne in mind by every young practitioner, and more frequently heeded by older ones: "*With all these changes, whether produced easily or tediously, in one or many hours, the practitioner should on no account interfere, provided the labor be natural.*"

SECTION IX.—SIXTH PRESENTATION, AND ITS MECHANISM.

This presentation is exactly the reverse of the third, *i. e.*, the anterior fontanel is behind the symphysis pubes, and the posterior at the promontory of the sacrum; the sagittal suture traversing the conjugate diameter of the superior strait, antero-posteriorly. In this presentation the dorsum of the foetus is to the spine of the woman, and the ventral aspect towards the linea-alba-abdominis. It occurs most rarely of any. Like the third, it is rejected by MM. Maygrier, Capuron, Madame La Chapell and Dugès. They argue against the possibility of its existence from the same data that they contend the third cannot obtain. With respect to the third, it is held that the forehead cannot remain on the sacro-vertebral angle during the contractions of the uterus any length of time, but must necessarily glide to one side or the other, thus spontaneously converting the presentation into either the first or second, as the anterior fontanel may pass to the right or left sacro-iliac junction, which will throw the posterior fontanel to the left or right acetabulum. In the sixth presentation it is averred the occiput being narrower than the forehead, would even be more likely

not to be maintained in its position at the sacro-vertebral angle, but would, if possible, more certainly glide to one side or the other, and convert the presentation into either fourth or fifth, as the occiput might pass to the right or left of the sacrum. No theory or hypothesis, however specious or plausible, can stand against well authenticated facts. In case of the third presentation we cited six cases as occurring in the European hospitals; and as regards the sixth, Dr. Dewees reports three cases that occurred under his own observation, two of which were twins, "but from the smallness of their heads they caused no delay in the labor." The third case was under the care of a midwife, but on account of the delay and the severe, frequent and inefficient pains, the Doctor's advice was solicited. He says: "I found the head still at the superior strait. The anterior-fontanel was immediately behind the symphysis pubis, the scalp was very tumid and pushed forward and downward. I waited for the effects of two or three pains, which I found did nothing more than to push the swollen scalp a little lower in the pelvis, but without advancing the head, though the efforts were very strong. I passed my hand up and turned the anterior-fontanel towards one of the acetabula, and then committed the case to the natural powers, which pretty soon accomplished the delivery." Both of these cases occurred in women who had previously borne children.

There is but little doubt that both this and the third presentation would occur much more frequently, were it not that the head spontaneously rotates at the superior strait, in consequence of the presence of the saero-vertebral angle, sufficiently to change it. But that it occasionally fails to do this, is evident from the fact that these presentations do occasionally occur.

The Mechanism. When the head is small and the pelvis sufficiently capacious to admit of its passage into the cavity, through the superior strait, there will be no unusual delay at this stage of labor, nor when the contrary obtains, provided the position be timely changed by turning the anterior fontanel to one of the acetabula, and thus converting it into the fourth or fifth presentation. When this is done the "case may be committed to the natural powers," but the same difficulty will be encountered by the head in escaping through the inferior strait, as has been already described where the forehead passes under the arch of the pubes. When the head is capable of entering the superior strait without a

change in its position, the occiput will pass down in front of the sacrum, and without rotating, presents itself at the inferior strait, and from the fact of its being small enough to enter the superior strait with its occipito-frontal diameter, antero-posteriorly, it will be able to pass the vulva much more easily than were it larger. In either case as soon as the head emerges from the vagina, the face turns to the right or left thigh as in the case of the fourth or fifth presentation.

CHAPTER III.

IRREGULAR OR ANOMALOUS VERTEX PRESENTATIONS.

EVERY accoucheur is cognizant of the fact, that the cranium occasionally presents to other parts than the fontanels, and to other points of the pelvis than the acetabula and pubis. The diagnosis of the exact position of the head, under such circumstances, is often very perplexing and unsatisfactory, especially in the early part of the labor, before the head has engaged in the superior strait. Baudelocque and others have described these anomalies as so many distinct presentations, as the parietal, ear, forehead, occipital, etc.; but they are only phases of or rather deviations from the regular vertex presentations. For instance, in the first presentation, with the posterior fontanel behind the left acetabulum, should the head from any cause, as a slight deformity of the pelvis, an irregularity in the contractions, or a want of uniformity in the dilatation of the os uteri, become inclined towards the left shoulder, the parietal protuberance of the right side would present in the centre of the pelvis; or should the chin be separated from the breast, from either of the foregoing or any other causes, the forehead would present at the centre of the pelvis; and so on, through all the presentations, there may be different variations from the vertex. These seldom impede labor materially, or inter-

fere with the mechanism of the presentations in which they occur, which proves their real character, and precludes the entertainment of the idea that they are distinct presentations.

Again, there might be, besides the six presentations given, a number of intermediate ones; in fact, some teachers admit of eight presentations. With the same propriety we might admit of sixteen, or indeed multiply them *ad infinitum*, if every point in the pelvic circle, at which a given part of the head might present, should be designated as indicating a particular presentation. The number that has been adopted and generally recognized by accoucheurs of every country, with more or less modification, is deemed sufficient for all practical purposes. More than these would unnecessarily complicate the subject, without adding anything to its utility; and less would not meet all the actual conditions met with in practice. In speaking of the multiplications of presentations, Dr. Dewees remarks: "It would be easy to multiply the presentations of the head, as Baudelocque justly observes, were it of any practical importance; but as this is not the case, it would only tend to embarrass, rather than answer any profitable purpose. *Mathematical precision is not required in such cases;* especially, as the mechanism of the labor is not altered; for, *when the posterior fontanel is at all in advance of the sacro-iliac junction,* either right or left, it will almost always eventually place itself under the arch of the pubis, and this is all that is necessary." This contains the whole gist of the matter, for in any of the intermediate presentations, where there is no abnormal obstruction, the head, from its shape and the peculiar structure of the pelvis, and the action of the uterus, will rotate to one of the six presentations, and effect its passage through the superior strait, by virtue of the mechanism of the presentation to which it rotates.

We have sometimes anomalies occurring after the head enters the cavity, where its movements fail, wholly or in part, to respond to the ordinary course of labor; that is, it rotates but partially, and is forced through the inferior strait diagonally; and sometimes it performs no rotatory motion whatever, but sooner or later passes the inferior strait transversely. This, however, can only be effected where the head is small or the pelvis unusually large. And perhaps it is to this cause that the non-rotatory motion is to be ascribed. The amplitude of the pelvis being so great, in propor-

tion to the size of the head, that the latter is not sufficiently impinged upon in its occipito-frontal direction to cause it to rotate.

There are occasionally anomalous movements of the head after its expulsion. Instead of the face turning towards the right groin, it rotates to the left. This anomaly, mentioned by Velpeau, we have frequently met with in practice. When it occurs, the rotation by which the occiput is placed under the arch of the pubis, and the shoulders, transversely with the superior strait is continued, making one long sweep, by which the foetus performs about half a spiral turn, from behind forwards, and in the first presentation, from left to right. Various explanations have been offered of this movement. Baudelocque attributes it to an excessive amplitude of the pelvis, and an undue smallness of the head. Velpeau combats this view, because he has seen it where no such disproportion existed, and where the labors were slow, and the head and pelvis bore due relations to each other; our own experience corroborates this statement. He suggests that it may depend upon some peculiarity in the form of the inferior strait of the excavation. Were this the cause, it would be a permanent one, and should produce the same effect, uniformly in the different labors of the same woman, of which fact he has not informed us. He also suggests, as a probable cause, some anomaly in the uterine contractions; and lastly, that the impetus originally communicated to the foetus; and which, after having first produced the common act of rotation, might be strong enough to compel the head and shoulders to rotate so as to perform a semicircular turn. This explanation is rather more problematical than might be supposed Velpeau would venture to enunciate. Though there is a semicircular spiral turn extending throughout the entire pelvic passage, performed by the foetus; it is not the rapid uninterrupted movement, characteristic of that of an impetus from a force suddenly applied, and then immediately withheld; but it is the result of a force continued during the movement, with intervals of suspension, and reapplication, such as is common to all labors.

All the explanations are mere hypotheses, alike untenable and unsatisfactory. These anomalies require further inquiry.

CHAPTER IV.

FACIAL PRESENTATIONS.

WHEN the face presents at either the superior or inferior strait, it is conclusive that the chin has separated from the breast prematurely, and the occiput been thrown back towards the sacrum of the foetus, and the face made the most pendent part of the descending body. This presentation is of rare occurrence, though it is occasionally encountered in practice. From statistical reports it is found to have occurred 244 times in 53,002 head presentations, or rather more than 4 in 1,000.

It was not until, comparatively, late years, that it was considered susceptible of spontaneous termination; it was, therefore, by Baudelocque, Dewees, and the writers of their day, and their predecessors, classed amongst preternatural presentations; and

FIG. 88.



FIRST FACE, OR LEFT FRONTO-ACETABULAR PRESENTATION.

some more recent authors, as Maygrier, Gardien, Capuron, etc., continue so to regard it.

On the other hand it has been abundantly demonstrated, that the safety of neither mother nor child is necessarily jeopardized by this position of the head; nor that it is dependent upon the interference of art for the termination of labors, where it is present.

Madame La Chapell was the first to take a firm stand against the ancient error, that designated face presentations as preternatural. She "laid it down as a principle, that this sort of labor is nearly as easy and as natural as that of the vertex, and affirmed that out of seventy-two cases of this kind, forty-two were concluded without danger either to mother or child." M. Desormeaux, Boer and other distinguished accoucheurs, gave their experience and the weight of their authority, in support of the newly enunciated proposition. M. Chevereul expresses himself thus: "*I can enumerate eighteen labors, that occurred either in my practice, or at the Maternité, at Angers, where the children presented the face, and which terminated naturally. All these children were of the common size; fifteen were born alive; three were dead, but appeared to have been so previously to the commencement of labor.*"

Velpeau says: "I have myself seen seven cases of face presentations; the children were born alive and well. I trusted the cases to nature, and no particular difficulties were observable."

Having given the experience of some of the ablest accoucheurs in the world, we will now compare measurements and see how far mensuration will go to confirm the possibility, and even probability, of the spontaneous termination of labors with face presentation.

When describing the pelvis, and foetal head, the standard measurements were given as follows: The transverse and oblique diameters, from 5 to $5\frac{1}{4}$ inches; the conjugate or antero-posterior, from 4 to $4\frac{1}{2}$ inches, at the superior strait, and from 4 to $4\frac{1}{2}$ inches in the conjugate, and $3\frac{1}{2}$ inches in the transverse, at the inferior strait. The diameters of the foetal head were given as follows: The occipito-mental, from 5 to $5\frac{1}{2}$ inches; the occipito-frontal, from 4 to $4\frac{1}{2}$ inches, and the bi-parietal or transverse, from 3 to $3\frac{1}{2}$ inches. Two other diameters of the head are involved in the mechanism of face presentations. 1. The vertical or trachelo-bregmatic, from the anterior edge of the foramen magnum to the high-

est point of the vertex, $3\frac{3}{4}$ inches; and 2. The fronto-mental from the protuberance of the forehead to the lower margin of the chin, 3 inches. In the first vertex presentation we have the head entering the superior strait with its occipito-frontal diameter of 4 or $4\frac{1}{2}$ inches engaging in the transverse or oblique diameter of the superior strait of 5 or $5\frac{1}{4}$ inches, leaving a clear unoccupied space of from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch, in the dried bones, and of course less in the living subject. At the inferior strait, the head with the same diameter, traverses the conjugate diameter, of the same measurement leaving no clear unoccupied space even in the dried bones.

Now, in the same numeral facial presentation, we have the face entering the superior strait, with the fronto-mental diameter of 3 inches, in the direction of the oblique diameter of from 5 to $5\frac{1}{4}$ inches, leaving a clear unoccupied space of from 2 to $2\frac{1}{4}$ inches in the dry bones, but less, of course, in the living subject, where the soft tissues fill up the pelvis, in a degree, and also increase the size of the head, showing the head should enter the superior strait more readily, in the face presentation, than where the vertex presents. Were the face to present with the fronto-mental diameter, in direction of the short or antero-posterior diameter of the superior strait of 4 or $4\frac{1}{2}$ inches (according to Dewees, third and fourth presentation, which it never does) there would be a clear space of from 1 to $1\frac{1}{2}$ inches, which would be abundant to allow of an easy entrance. The head, having gained the pelvic cavity in this position, by the transverse or oblique diameter, finds no difficulty in rotating so as to bring the fronto-mental diameter in direction of the antero-posterior diameter of inferior strait, as none of the diameters of the head involved are so great as to interfere with that movement. In the first face presentation, the head rotates from right to left, bringing the chin under the arch of the pubes, and placing the forehead in the hollow of the sacrum. We now have the face presenting at the inferior strait, with the fronto-mental diameter of 3 inches, in direction of the antero-posterior diameter of from four to $4\frac{1}{2}$ inches, leaving here a clear unoccupied space of from 1 to $1\frac{1}{2}$ inches, just that much more than is afforded in vertex presentations. The *mechanism* of this presentation, at the inferior strait, is somewhat peculiar, which will be given in detail in its proper place. In its passage through the inferior strait,

the verticle diameter of the head, of $3\frac{3}{4}$ inches, comes in direction of the antero-posterior of the strait of 4 or $4\frac{1}{2}$ inches, thus leaving a clear space of from 1 to $1\frac{1}{2}$ inches between the head and pelvis at that point. After the birth of the head, the body is delivered as in vertex presentations. Thus we see, from the experience of distinguished accoucheurs, and actual measurement and demonstration, that face presentations are clearly within the domain of eutocia, and, as a variety of cephalic eutociae, it will be regarded and treated.

Cause. Various cause's have been assigned for face presentations, such as the obliquities of the uterus, the inclination or obliquity of the foetus, within the uterus, while it retained its normal position, etc., etc., etc. But, as in the other anomalous presentations, all explanations are mere hypothesis, no one of which ever offered being exempt from objection and refutation, we shall not attempt to assign a cause, presuming that sometimes it is due to one, and at other times to another. It has been met with in connection with uterine obliquity, and without it; and it has occurred without any apparent cause. Unless something conclusive and satisfactory can be given, it is best to make no attempt, lest the student be led into error and confusion.

Diagnosis. The diagnostic marks of face presentations, both negative and positive, are very distinct and conclusive. First, negatively, there is absent at the straits, after labor has actually commenced, that round, hard, voluminous body that characterizes the cranium; an absence of the fontanel and the sagittal suture. The positive marks are the presence of the forehead usually towards the left side of the pelvis, the eyes, nose, mouth and chin; these can be traced one after another in succession, and are the most pendent parts of the head. With such distinct signs, the presentation need not be mistaken.

SECTION I.—THE DIFFERENT PRESENTATIONS OF THE FACE.

As it has been shown that these presentations are but diversities of cephalic eutocia, they cannot be regarded as any other than reverted vertex presentations, and, as such, present different varieties. As simplicity and perspicuity is our object in treating of all the foetal presentations, we shall in this, as in the instance of ver-

tex presentations, adopt the course we consider the most practicable and comprehensible, and leave prolixity and obscurity to those who prefer learned, useless display, to plainness and utility. Some authors, according to our notion, unnecessarily mystify the subject by dividing and subdividing it into genera, classes, orders, varieties, etc., etc., each of which requires as great an effort to remember, as it would to comprehend and retain the whole, if plainly and comprehensively presented. Some of the more recent writers assign to face presentations the same classification and arrangement that they employ in those of the vertex, which we consider unnecessarily prolix and obscure, because they are not of corresponding practical utility.

Dispensing with these, then, we shall adopt as our^r own, a modification of the arrangement of Baudelocque, modified by Dewees, as being the most simple and useful. As in case of the vertex presentations, we shall give the classifications of the different authors, so that the student may not be ignorant of what they are, and be at liberty to adopt that system which he may think superior to the one we offer for his acceptance. Baudelocque selected the chin as the distinguishing part of the face, and assigned it four positions, which he designated as follows:

- 1st. Mento-pubic—Chin to the symphysis pubes.
- 2d. Mento-sacral—Chin to the sacrum.
- 3d. Right mento-iliac—Chin directed to the right side.
- 4th. Left mento-iliac—Chin directed to the left side.*

Deweес has modified this arrangement, by selecting the forehead as the distinguishing part of the face, because it is more readily distinguished than the chin. It is true the inexperienced practitioners may meet with some difficulty in determining the exact character of the presenting part, and confound the forehead, with

* Velpeau gives the following as Baudelocque's arrangement, which shows that he made the forehead his distinguishing part of the face, instead of the chin, as given by Cazeaux. They are the same, in fact, but how these authors should disagree in the description, so far as to reverse that of their distinguished countryman, it is difficult to determine.

Face. { 1. Forehead upon the symphysis pubes.
2. Forehead upon the sacro-vertebral angle.
3. Forehead upon the left ileo-pectineal eminence.
4. Forehead upon the right ileo-pectineal eminence.

some other portion of the cranium—but a little further exploration will reveal the presence of the eyes and root of the nose, which will dissipate all doubts, and determine the character of the presentation. Our author has further modified Baudelocque's division by reversing his order, in which he says there is a propriety; as, “I hold it to be a good rule, to place first in the numerical arrangement, the most frequent of a particular presentation—and I am persuaded, as far as I dare trust my own experience, that the first and second of my arrangement, are far the most common.” By thus reversing Baudelocque's arrangement, and classifying the presentations according to the frequency of their occurrence, we have an order in uniformity with that of the vertex, which is very opportune as one will assist the memory in regard to the others. The arrangement of Dewees is as follows:

1. Forehead to the left and chin to the right side.
2. Forehead to the right and chin to the left side.
3. Forehead to the pubis and chin to the sacrum.
4. Forehead to the sacrum and chin to the pubis.

Deweess doubts that the last two, or antero-posterior presentations, have ever occurred. He has never met with either of them, and says Baudelocque does not appear to speak from his own observation on this subject.

The student should not remain unmindful of the fact, that the face does not always present entire, sometimes the forehead is found much lower than the chin, the latter being scarcely within reach of the finger, and sometimes it is *vice versa*. Sometimes the chin and one cheek presents, while the remaining part of the face is out of reach. Either of these varieties, or almost any other anomaly may be either primary or secondary, *i. e.*, it may exist before labor has commenced, or it may not occur until after it has made some progress. These facts should be borne in mind when trying to make a diagnosis, during such irregular presentations. As the first and second presentations of Baudelocque, and the third and fourth of Dewees, the same in effect, are without existence in fact, it is useless to continue them, as this would only be to unnecessarily task the student's mind, which has enough to occupy it, in acquiring what is real, and useful. We shall therefore dispense with them, and follow most of the latest writers in giving

but two face presentations, which we will arrange according to the plan of Dr. Dewees, as follows :

1. Left fronto-acetabular.—The forehead to the left acetabulum, and the chin to the right sacro-iliac junction.

2. Right fronto-acetabular.—The forehead to the right acetabulum, and the chin to the left sacro-iliac junction.

This disposition of the presentations of the face, we consider, comprises more simplicity and utility, than any other, that has been made of them, and as such would recommend its adoption.

The following table shows the arrangements offered by several distinguished authors, all of whom make the chin the distinguishing part :

TABLE OF FACE PRESENTATIONS.

Names of Authors.	Presentations.	Relation of the chin to the different parts of the Pelvis.	Names of the positions.
Gardien.....	Four.	Same as Baudelocque.	Same as Baudelocque.
Capuron.....	Four.	1. Chin to the left acetabulum. 2. Chin to the right acetabulum. 3. Chin to the right sacro-iliac symphysis. 4. Chin to the left sacro-iliac symphysis.	1. Left mento-cotyloid. 2. Right mento-cotyloid. 3. Right mento-sacro-iliac. 4. Left mento-sacro-iliac.
La Chapell.....	Two.	1. Chin directly to the right. 2. Chin directly to the left.	1. Right mento-iliac. 2. Left mento-iliac.
Velpeau.....	Two.	Like La Chapell.	Same as La Chapell.
Moreau.....	Two.	1. Chin. { Anterior. Transverse. Posterior. 2. Chin. { Anterior. Transverse. Posterior.	1. Right sacro-ileum. 2. Left sacro-ileum.

SECTION II.—1. LEFT FRONTO-ACETABULAR PRESENTATION, AND ITS MECHANISM.

This, the third presentation of Baudelocque, is where the forehead presents to the left acetabulum, and the chin to the right sacro-iliac junction, the face traversing the superior strait obliquely

from left to right. In 22,243 cephalic eutocial labors, it occurred 53 times, or nearly 2.40 in 1000.

This being but a deviation, of the head, from the first vertex presentation, the relative position of the body of the foetus, to the parts of the abdomen of the woman, is the same as in the latter case; *i. e.*, the posterior plane, is to the left side, and the anterior to the right. (Fig. 88.) Before the membranes are ruptured, and the waters escape, the diagnosis is, sometimes, very difficult, or even impossible, on account of the difficulty in reaching the presenting part; after this occurs, however, and the head descends, it is more easily accomplished.

The Mechanism. After the membranes are ruptured, the mechanism of the labor commences, which resembles that of the first vertex presentation. By substituting the fronto-mental diameter, for the occipito frontal of the cranium, we have an exhibition of the same process, as descent, rotation, expulsion, and external rotation. Before the rupture of the membranes, the head is but moderately extended, which brings the forehead near the centre of the superior strait, where it is more easily detected, by the touch, than either the chin, or any other part of the face; in its descent after the discharge of the waters, it passes toward the left acetabulum, where it meets with resistance from the ilio-pubic line, which completes the extension, and the presentation. It has been shown that the diameters of the pelvis, so far exceeds those of the face, and the vertical one of the head, as to allow of its easy passage through the straits. After it has passed the superior strait, in an oblique direction, gained the cavity, and rotated, by the chin passing from right to left, so as to present at the symphysis pubes, and the forehead in the hollow of the sacrum, the occiput being at the sacro-vertebral angle, and the breast about the superior strait in front, the head further descends in response to the action of the uterus, the chin passes under the arch of the pubes, and the neck, at the hyiod region, comes against the lower margin of the arch, which arrests the further descent of the face in that direction, and forms the centre of a semi-circle described by the head anteriorly, that point of the pelvis constituting the fulcrum or centre upon which the semi-circle is described; the uterus now, acting through the spinal column, exerts all its power upon the posterior part of the

head, and forces it down in front of the sacrum and coccyx, a distance of six inches, while the chin remains stationary, thus making the semi-circular movement, during which the occiput sweeps the sacral excavation, the coccyx and perineum, and escapes from the posterior commissure of the vulva, at the same time the chin moves up toward the mons veneris. The head, as it escapes the inferior strait, has its vertical diameter in direction of the antero-posterior diameter of that strait. As the head passes the vulva, the shoulders take possession of the pelvic cavity; after a few seconds' ease, the uterus again contracts upon the body of the foetus, causing it to rotate; the right shoulder passing from right to left, engages under the arch of the pubes, at the same time the face turns to the right groin, and the labor is completed in the same manner as in vertex presentations.

SECTION II.—RIGHT FRONTAL-ACETABULAR PRESENTATION, AND ITS MECHANISM.

This presentation is indicated by the presence of the forehead at the right acetabulum, and the chin at the left sacro-iliac junction; the face traversing the superior strait obliquely from right to left. The body maintains the same relative position to the different parts of the maternal abdomen, as in the second vertex presentation, viz.: the dorsum to the right, and the ventral portion to the left. This is the fourth presentation of Baudelocque, and it occurred .50 times in 22,243 cephalic eutocial labors, or 2.25 in 1000. The same difficulty attends making the diagnosis, as obtains in the former face presentation; and, like it, disappears upon the rupturing of the membranes.

The Mechanism. After the escape of the waters, the face enters the superior strait, in the direction already stated; the rotation takes place from the same cause, as produces it in the preceding presentation, but the face turns in an opposite direction, the chin passing from left to right, to engage under the arch of the pubes. The rotation is effected with less difficulty than in the last instance, on account of the position of the rectum, which operates against the rotatory movement in the second vertex and first face presentations alike. After the chin is placed under the arch of the pubes,

and the forehead in the hollow of the sacrum, the labor is completed in the same manner as in the former case.

Remarks. With Baudelocque, Dewees, their cotemporaries and predecessors, it was a foregone conclusion that face presentations were preternatural, and required the interference of art. Dr. Davis recommended turning, indiscriminately, in all face presentations. Dr. Dewees directs that the hand should be so far introduced into the uterus, as to be able to change the position of the head, by drawing down the vertex, and elevating the chin toward the breast, thus restoring the flexed position, which, from some cause or other, has been disturbed. After the face has entered the cavity of the pelvis, he recommends, in the absence of pain, to raise the head above the superior strait, and restore the flexion there. In the second presentation he employs the left hand for this purpose, while the right is better adapted to the first.

Although we have met with no well authenticated case of antero-posterior presentation of the face, the first and second of Baudelocque, or the third and fourth of Dewees, both being of that character, they are retained in their works evidently from the fact, that in autopsies the face has been found occupying that position above the superior strait; but the action of the uterus, aided by the anterior projection of the sacro-vertebral angle in the living subject, changes the position to one or the other of the presentations already described. Neither of these authors, nor any that we have examined, gives either of these presentations, as occurring, at term, in their practice, but in abortions they are not so unfrequent. As in the case of vertex presentations, there are anomalies in those of the face. It may be that the one side of the face may be turned toward the shoulder, and instead of either extremity of the fronto-mental diameter presenting, we may have a cheek or one side of the forehead. In fact, there is an infinite number of shades of difference, which it would be needless to specify, as they either are converted by the action of the uterus, into one of the regular face presentations, and made amenable to its mechanism, or are the proper subjects for the interference of art, which matter we defer for future consideration.

CHAPTER V.

PELVIC EUTOCIA.

By pelvic eutocia is meant the presentation of the pelvic extremity of the foetal trunk, at the straits of the maternal pelvis instead of the head. It includes the presentations of the breech, feet and knees, the last two being but varieties of pelvic presentations, and amenable to the same mechanism as the breech. In 69,960 labors reported from different public institutions and private practice in Europe, 2,375 were pelvic presentations, or about one in thirty-three labors. It occurs very much more frequently than face presentations, being in the proportion of one of the latter to eight and a half of the former. It was formerly classed amongst the preternatural presentations, as it is yet considered by some authors. Ramsbotham, amongst others, regards it as such, notwithstanding the experience of practitioners in all ages, which is that such labors most generally are capable of unassisted termination. These labors are usually more tardy than where the vertex presents, and the children are more apt to perish, but a large proportion so born, survive their birth. Out of 804 children born thus, at the *Maternité*, Paris, 581 were living.

The increased number of still-born children, in pelvic presentations, compared with those of the vertex, is due, according to Velpeau, to the imperfect dilatation of the os uteri. In the former instances, especially where the lower extremities present, as the feet or knees, they can protrude while the os is comparatively undi-

Fig. 89.



FIRST PELVIC, OR LEFT SACRO-ACETABULAR PRESENTATION.

lated, which at each pain, contracts upon the protruding parts to such an extent as to interfere with the free circulation, and as they gradually descend, and the hips engage and pass the orifice, the body, in its slow progress, is subject to like pressure, and the abdomen and thorax, being subject to it in overcoming the resistance of the cervix and os, are liable to great danger from the pressure of the liver and other abdominal viscera upon the larger vessels. And the circulation of the cord being interfered with, by its being pressed between the breast and brim of the pelvis, the action of the heart must be greatly impeded, if not entirely arrested; while, in the vertex presentations, the head, being the most voluminous part and able to resist this action of the os uteri, from its hardness maintains its position at the vertex, until the dilatation is sufficient to allow it to pass; the head having escaped is rapidly followed by the thorax and abdomen, without any injury whatever being sustained from compression.

That this may sometimes be the cause of the child's death is admitted, but that it is generally so is very doubtful, as a dilatation sufficient to allow of the passage of the hips, the circumference of which is nearly equal to that of the head, and the compressibility of the pelvis being but little, if any, greater than that of the cranium, would be equal to the transit of the abdomen and thorax without injurious compression.

A cause, to which death is much more frequently attributed, is to be found in the retention of the head within the pelvis, after the expulsion of the body. This retention is sometimes maintained for a long while, on account of the alleged difficulty in disengaging it, while but a few seconds will often be sufficient to cause death. As has been stated heretofore, it is no unusual occurrence for the placento-uterine circulation to be arrested by the separation of the placenta from the uterus, during the last expulsive contraction. In this instance the contraction, by which the body is expelled, is as effectual in separating the placenta as though it were attended with the entire expulsion of the foetus, in a vertex presentation, because it is virtually the same. In the former instance, the body is propelled through the external organs, and the head is almost and frequently quite removed from the uterine cavity, which allows the organ to contract, so far as to reduce the space occupied by

the placenta, to so great an extent as to separate it entirely; thus cutting off completely the foetal circulation, by means of which its life is preserved during its intra-uterine existence. After birth, its life is continued through the medium of respiration, the atmospheric air supplying oxygen, the life-sustaining element, hitherto furnished by the maternal blood. While the head remains in the vagina, respiration is impossible, of course no oxygen can be conveyed to the lungs, and the child, half born, dies of asphyxia. We have met with no instances of still-born children, where the birth of the body was immediately followed by that of the head. But in almost every one where it has admitted of but a few minutes' delay, death has been the result.

When the membranes remain entire until the os uteri is fully dilated or dilatable, and the breech presents and the presentation is regular, and the child passes double, that is, the body and extremities together, and where the flexion of the head is duly maintained, pelvic presentations are attended with but little if any more delay or danger than those of the vertex. For this reason they should be left entirely to the efforts of the organism. But where any material deviation from these conditions occur, proper and judicious interference may be necessary. We would here particularly enjoin upon the young practitioner not to interfere with breech presentations, by drawing down the feet with a view of diminishing the bulk of the presenting body, and thus facilitating the termination of the labor. Such meddling is seldom attended with anything but mischief. By allowing the labor to proceed undisturbed, the contraction of the circular fibres of the uterus keeps the arms in their proper position at the sides of the trunk which, when separated during the labor, always complicate it and cause trouble in extricating them from the pelvis. It is as important in breech as in vertex presentations, that all parts of the foetus should be maintained in their natural positions, and the general oval shape of the figure be preserved. Some delay is apt to be encountered, as the pelvis and flexed thighs are about to engage in the os uteri, but after they have once escaped from it and passed the vulva, as in case of the vertex presentations, the remaining portions of the body rapidly follow; so also does the head unless extension be made while it is passing through the pelvic cavity. Should this occur, it must be disengaged by a manœuvre hereafter to be explained.

SECTION I.—CAUSES OF PELVIC PRESENTATIONS.

As has been already elsewhere stated, it was the opinion of the ancient that the foetus was developed with the head at the fundus, and the breech in the inferior portion of the uterus; and that it remained in this position until about the seventh month, when it performed the *soubresant* movement, by which the position was reversed and the head brought downwards while the breech was made to occupy the fundus. By this hypothesis, pelvic presentations could be easily explained, as it only required a failure to perform this reversing movement to bring the pelvis or breech to the superior strait at the time of labor. But since this theory has been proved to be erroneous, the explanation it affords of pelvic presentations, becomes of no account and is of course rejected by all modern writers.

It has been suggested by Velpeau that about the period when the length of the occipito-coccygeal diameter of the foetus—that is its length from the occiput to the coccyx—begins to exceed that of the transverse or horizontal diameter of the uterus, it may happen that the head being carried upwards by some sudden movement, upon lying down or from some other cause, fails to resume its original position. It has also been referred to some peculiarity in the conformation of the uterus or pelvis in such cases. Were this the case, every birth in the same woman, would, per necessity, be that of breech presentation, with which proposition our experience and observation are at direct variance.

The truth is—like many other of the unseen phenomena within the uterus—it is unaccountable in the present state of our knowledge. All we have upon the subject is mere hypothesis unsupported by a single confirmatory fact.

1. *Diagnosis.* Before the membranes are ruptured, and the breech is engaged in the inlet, the diagnostic marks are rather obscure; negatively, there is an absence of the hard, voluminous cranium, of the fontanelles, and the sagittal suture; positively, a round, comparatively soft and elastic structure is most commonly felt within the circle of the partially dilated os uteri. This is one of the nates. Owing to the lateral obliquity of the uterus, or the oblique position of the foetus, within its cavity, one or the other of

the nates is usually found to present. There is often considerable difficulty in making out the presenting part; the imperfect dilatation of the os circumscribes the ability to make a thorough exploration, and, by a comparison of parts, to ascertain the exact presentation. It may be mistaken for some other part, as a shoulder, a knee, or other fleshy portion of the body. It often occurs, that a side of the breech presents, and that the coccyx, the depression between the nates, the anus and genitals cannot be reached, because they are too high up, and enclosed within the circle of the os; such presentations can only be determined by much experience in touching. The young accoucheur cannot hope to derive much satisfaction from those cases until after the evacuations of the waters, the full dilatation of the os uteri, and the complete engagement of the breech in the superior strait; then the recognized nates, one or both, the fissure between them, the coccyx, anus, the genitals, as the labia of the female, or the scrotum and penis of the male, will reveal, to his great satisfaction, the true character of the presentation.

Should one or both feet present at the superior strait, they may be distinguished from the hand, the only part with which they are likely to be confounded, by the heel and toes, the latter of which are shorter than the fingers, and arranged in a direct line, and by the absence of the thumb, placed out of the range of the fingers.

Knee presentations may be detected by the hard, round tumor-like body presenting, the flexion ascertained by the thigh and calf of the leg lying in contact above the presenting part, and by passing the finger around the joint into the flexed popliteal space, etc.

SECTION II.—THE DIFFERENT PELVIC PRESENTATIONS.

Like the presentations of the vertex and face, those of the pelvis are distinguished by different parts of the foetus presenting to different points of the superior strait.

In order to maintain an entire uniformity in regard to the various presentations of the foetus, we shall adopt the arrangement of Dewees in relation to those of the pelvis, which differs from that of Baudelocque only in reference to the nomenclature employed. In order that the student may acquaint himself with the different arrangements of various authors, we shall, as in the case of the vertex and face, present him with their classifications.

That which we have adopted is arranged according to the frequency of the occurrence of each one, and is as follows, the sacrum being employed as the distinguishing part of the presenting body. It admits of four positions, viz.:

TABLE OF PELVIC PRESENTATIONS.

Deweys. { 1. The sacrum to the left acetabulum, and the abdomen to the right sacro-iliac junction.
2. The sacrum to the right acetabulum, and the abdomen to the left sacro-iliac junction.
3. The sacrum to the symphysis pubis, and the abdomen to the projection of the maternal sacrum.
4. The sacrum to the sacro-vertebral angle, and the abdomen to the linea alba.

Baudelocque. { 1. Sacrum at the left cotyloid cavity, called left sacro-cotyloid.
2. Sacrum at the right cotyloid cavity, called right sacro-cotyloid.
3. Sacrum at the symphysis pubis, called sacro pubic.
4. Sacrum at the sacro-iliac angle, called sacro, or lumbo-sacral.

Gardien. The same as Baudelocque.

Capuron. { 1. Sacrum at the left acetabulum, called first.
2. Sacrum at the right acetabulum, called second.
3. Sacrum at the right sacro-iliac symphysis, called third.
4. Sacrum at the left sacro-iliac symphysis, called fourth.

La Chapell. { 1. Loins to the left, called left lumbo-iliac.
2. Loins to the right, called right lumbo-iliac.
3. Loins in front, called lumbo-pubic.
4. Loins behind, called lumbo-sacral.

Velpeau. { 1. Sacro-anterior.
2. Sacro-posterior. } He regards these two as the real presentations, of which the others are mere shades.

Moreau. { 1st position. Left sacro ileum. { Anterior.
Transverse.
Posterior.
2d position. Right sacro-ileum. { Anterior.
Transverse.
Posterior.

Cazeaux adopts the arrangement of Velpeau.

In these presentations the manner of the disposition of the extremities is the same as in vertex presentations, that is, the legs are flexed upon the thighs, and the thighs upon the abdomen. The arms are placed firmly against the sides, and the forearms inclined diagonally across the breasts from below upwards, the hands being close to the chin which is inclined upon the breast while the head is in a state of flexion. The foetus maintains the squatting position in the pelvis.

SECTION III.—FIRST PELVIC PRESENTATION, AND ITS MECHANISM.

The posterior plane of the foetal sacrum in this presentation is behind the left acetabulum, with the pubes looking towards the right sacro-iliac symphysis, and the fissure between the nates, traversing the superior strait diagonally from left to right. The back of the foetus is to the left side of the uterus towards the front, while the abdomen is to the right towards the back. Its left side looks to the front and towards the right, and the right to the back towards the left. The great or transverse diameter of the pelvis corresponds with the oblique diameter of the superior strait from right to left, and the short or antero-posterior diameter to the other oblique diameter of the strait from left to right.

Mechanism. We have already stated that before the rupture of the membranes the diagnosis is difficult; this is on account of the breech being too high up to be distinctly felt by the finger. It is a circumstance common to all the presentations of the breech.

At the moment the membranes give way, there is a very large discharge of waters, compared with that in vertex presentations, because the breech, like the head, does not so completely fit the pelvic circle at the brim as to prevent the descent of the liquor amnii, hence the discharge is much greater. As soon as this occurs, the breech becomes more accessible, on account of the action of the uterus forcing it down; and the presentation can be ascertained.

If the os uteri be fully dilated, the nates immediately engage in the inlet; but if the contrary obtain, this is longer delayed. As the os uteri dilates and the contractions increase in strength, the breech gradually descends into the cavity in the oblique direction, in which it at first engaged; the left hip passing down behind the obturator foramen and over the internal obturator muscle on the left side, and the right in front of the structures occupying the lateral posterior portion of the pelvis on the right side.

The breech having arrived at the inferior strait, it and the body perform a movement of rotation analogous to that of the head in vertex presentations, by which the left hip is placed behind the symphysis pubes, and the right in the hollow of the sacrum, which brings the great or transverse diameter of the foetal pelvis in di-

rection of the antero-posterior or long diameter of the inferior strait, and the back directly to the left and the abdomen to the right side of the mother.

Responsive to the action of the uterus, the breech continues to advance; the left hip engages under the arch of the pubes and appears without the vulva; here it remains stationary, while the right hip traverses the coccyx and perineum and is first to disengage itself at the posterior commissure of the vulva; in effecting this

Fig. 90.

DELIVERY OF THE BREECH
PRESENTATION.

movement it describes the arc of a circle around the stationary left hip which serves as the centre, while it remains immovable at the apex of the arch. While the breech is passing through the external organs the body is flexed laterly on the left side, in order to accommodate itself to the curvature of the pelvic canal; the left hip as it escapes from the vulva, raises up towards the mons veneris, which movement admits of the flexion. This process is sometimes

accomplished during a single pain, while at others, several are required to consummate the delivery of the breech. This is presently followed by the thighs closely applied to the abdomen, which separate from it as soon as the descending body carries the flexed knees beyond the vulva. Immediately following the delivery of the lower extremities, the chest with the arms applied to the anterior portion of the sides, engages in the inferior strait, and passes the vulva when the shoulders appear at the outlet and effect their disengagement in the same manner that the hips were delivered, viz.: by the left one passing under the arch of the pubes and the right traversing the hollow of the sacrum, coccyx and perineum and both emerging from the vulva simultaneously or nearly so. In the meantime, the head flexed upon the breast, passes the superior strait in the direction of the oblique diameter from left to right and occupies the cavity. Upon arriving at the inferior strait, it rotates so as to bring the forehead into the hollow of the sacrum, the face upon the perineum and the occiput behind the symphysis of the pubes, the nape of the neck occupying the arch below it. The occipito-frontal diameter is now in direction with the antero-posterior or long diameter of the in-

ferior strait, the last position it assumes in vertex presentations, from which it differs only in the fact, that the base, instead of the vertex of the cranium, is the presenting part.

The head, now cleared of the uterus, derives no assistance from it, in effecting its delivery. Sometimes, however, it is expelled by the impetus the body receives from the contraction that forced it through the pelvis; that is, the upper part of the trunk, the shoulders and the head are all expelled by the same pain; but this is not always the case. When it does occur that the head is retained in the cavity of the pelvis, after the body and shoulders have escaped, and the uterus is powerless, the pressure it makes upon the bladder and rectum, causes such a degree of tenesmus that the most violent straining is induced, which, aided by the direct action of the abdominal muscles upon the head, induced by these physiologico-voluntary efforts, causes its expulsion, the chin first escaping at the posterior commissure, followed immediately by the remaining portions of the face, and the anterior part of the head, the nape of the neck remaining, during these movements of the head, stationary at the lower margin of the arch of the pubes, and forming the centre, about which the arc of a circle is described, as the face sweeps the perineum.

The foregoing is a description of a labor, with first breech presentation, when left entirely to the unassisted action of the organism, where the natural flexion of the head is maintained throughout the whole of the process.

SECTION IV.—SECOND PELVIC PRESENTATION, AND ITS MECHANISM.

This is where the posterior plane of the sacrum is behind the right acetabulum, and the pubis looking towards the left sacroiliac symphysis, with the fissure between the nates traversing the superior strait, diagonally from right to left. The back of the foetus is to the right side of the uterus, towards the front, and abdomen to the left, towards the back. The left side occupies the posterior portion of the left side of the uterus, and the right, the anterior portion of the right side.

Mechanism. The mechanism of labor in this presentation differs from that of the first only in the fact that all the move-

ments are reversed ; the right hip presents to the arch of the pubis instead of the left, and the rotation is performed from right to left, instead of from left to right, as in the first presentation. The right hip engages under the arch of the pubes, while the left occupies the hollow of the sacrum, and traverses the perineum to the posterior commissure of the vulva, while the right remains stationary under the arch, forming the centre around which the arc of a circle is described by the movements of the left. The flexion of the body, as the breech passes the inferior strait, is on the right side, instead of the left. The head engages in the superior, diagonally with the occiput to the right side, and upon reaching the superior strait, rotates from right to left, the occiput getting behind the symphysis pubes, and the nape of the neck occupying the summit of the arch. The expulsion of the head is now effected in the same manner precisely as in the first pelvic presentation.

SECTION V.—THIRD PELVIC PRESENTATION, AND ITS MECHANISM.

Here the sacrum is behind the symphysis of the pubes, and the foetal pubis looks to the promontory of the sacrum of the mother; the fissure between the nates traverses the superior strait antero-posteriorly. The dorsal surface of the foetus is to the front of the uterus, while the abdomen and folded extremities look towards the back. The right side of the foetus is to the left of the mother, and the left to the right.

Mechanism. In this presentation the breech enters the superior strait with its long or bi-iliac diameter in direction of its transverse diameter, and passes directly to the cavity of the pelvis, and on to the inferior strait; here it rotates either to the left or right, and it is as likely to be one way as the other; if the former obtains, the delivery will be effected in the same manner as in the first breech presentation ; if it revolves to the right, the mechanism of the second will be observed.

This presentation may be less favorable than either of the foregoing ones, on account of the possibility of the head engaging in the superior strait, with its occipito-frontal diameter in direction with antero-posterior or short diameter of the inlet. While this is barely possible, it is of extremely rare occurrence, because the

face or forehead coming in contact with the promontory of the sacrum or sacro-vertebral angle, is very apt to glide to one side or the other, placing the head in the position of either the first or second vertex presentation, viz.: with the anterior fontanel to the right or left sacro-iliac junction, and the posterior behind either the left or right acetabulum. It then passes to the cavity, and engages in the inferior strait without rotating, and escapes as in the first or second presentation.

SECTION VI.—FOURTH PELVIC PRESENTATION, AND ITS MECHANISM.

The fourth pelvic presentaion is when the sacrum of the foetus is in front of the sacro-vertebral angle, and the pubis is toward that of the mother, and the fissure between the nates traverses the superior strait antero-posteriorly from behind forward; with the back of the foetus to that of the mother, and the abdomen looking directly to the front of the uterus, and the right and left sides corresponding to the same of the mother.

This presentation occurs much more rarely than either of the three preceding ones. Dr. Dewees avers that he never met with it but once in his long experience, and in the reports of "*l'Hospice de la Maternité*," it is represented as occurring but once in more than twelve thousand labors.

Mechanism. As in the third pelvic presentation, the breech in this one enters the superior strait with its broadest or bi-iliac diameter in direction with the transverse diameter of the strait, and descends as in the third pelvic presentation, until it arrives at the inferior strait, where it rotates either to the right or left, describing a semicircle, and converting it into the second or first, by bringing the right or left hip under the arch of the pubes, after which the breech is delivered by the mechanism of either the second or first presentation, according to the side to which it rotates, the right or left.

The same difficulty may possibly occur in regard to the head, as was referred to in the last presentation, that is, the great or occipito-frontal diameter may engage in the short or antero-posterior diameter of the superior strait, and be unable to pass through it; such a case would clearly indicate the interference of art, and pro-

perly constitute a case of dystocia. We mentioned, when considering the mechanism of the last presentation, that such a misfortune was barely possible, but not very probable, in reference to it. The probability is even less in this, because the occiput, which is narrower than the forehead, more easily slides to one side or the other of the sacro-vertebral angle, causing the head to occupy the same position that distinguishes the third or fourth vertex presentation, viz.: the posterior fontanel at the right or left sacro-iliac junction. It then passes on and engages in the inferior strait, without rotating, and escapes through the strait, the face and forehead passing under the arch of the pubes, and the occiput sweeping the sacral excavation and perineum, and passes the posterior commissure of the vulva, before the forehead leaves the arch of the pubes.

In view of the dimensions of the head, compared with the diameters of the straits, and all other conditions being favorable, it is barely possible for the head to deliver itself in this presentation. But when the helplessness of the uterus, and its inability to render any assistance, from the fact of the head having passed the os uteri, is considered, the necessity of manual assistance becomes apparent, and if it were of more frequent occurrence, it would often be found to constitute a dystocial labor.

CHAPTER VI.

PRESENTATIONS OF THE FEET.

THIS class of presentations can only be regarded as a variety of those of the pelvic extremity, and Cazeaux considered those of the breech, feet and knees, as but one, the different parts presenting, being only grades of pelvic presentations. This we think is too indefinite, and not sufficient to instruct the student or young practitioner fully, in regard to his duty, and the course of action for him to pursue, in each particular variety. Be sure they are all classed under the general head of eutocia, because they are suscepti-

ble of spontaneous termination, but it is evident from universal experience, and from the very nature of the presentations, *cæteris paribus*, that assistance is more likely to be needed in those, than in the presentations of the vertex. This fact was so apparent to the older writers, that the different presentations of the pelvic extremity, were uniformly classed among the preternatural labors, those requiring assistance. Baudelocque was, perhaps, the first to commence a divergence from this long established opinion, while he still regards feet presentations as preternatural, he admits "they must be esteemed the easiest and most favorable" of that class. Dcwees, while he considers breech presentations, rather more painful and tedious for the woman to bear, holds they are more favorable for the child, yet insists that manual aid is necessary, and directs that all labors in breech presentations, must be assisted by bringing down the feet; at the same time he avers that feet presentations must be left to the unassisted efforts of the organism, unless some untoward circumstance should arise, rendering interference necessary. By this manœuvre he converts a breech presentation, which is the more favorable to the child, into one of the feet, which, according to his showing, is more unfavorable; from this exhibition, it is evident, that the interference he recommends in presentations of the breech, can but be mischievous, and should not be practised under ordinary circumstances. While we consider feet presentation, only a variety of those of the pelvic extremity, we regard them of sufficient importance to be entitled to a separate consideration.

They occur less frequently than those of the breech, in forty-eight thousand one hundred and forty-seven labors, the feet presented six hundred and forty-seven times.

Previously to the full dilatation of the os uteri, and the rupturing of the membranes the exact presentation is of difficult diagnosis. Though the absence of the round, firm structures of the head, will be conclusive that the presenting part is some other than the cephalic extremity, and the long pointed shape of the bag of waters, which may, during a pain, be found protruding through the imperfectly dilated os uteri, or pressing firmly against its interior margin, may give rise to a suspicion of the presentation, but its real character cannot be determined with certainty

until the labor has farther progressed, the os uteri become more perfectly dilated, the waters discharged, and the presenting part so far advanced, as to be within reach of the finger, when it may be determined by the marks referred to, while considering the diagnosis of breech presentations. The only part with which the feet can possibly be confounded is the hand, and the distinctive marks between them, are so plain, that, with proper care in comparing the two, no mistake need to arise in regard to them.

SECTION I.—THE DIFFERENT FEET PRESENTATIONS.

As in the case of all the preceding presentations of the foetus, those of the feet also, are characterized by a plurality of manifestations. The feet have their distinguishing parts, which present to different points of the pelvis, and thereby determine the character of each presentation.

In describing the different presentations of the feet we shall continue to follow the simple and admirable arrangement instituted by Baudelocque, and adopted by Dewees and others; but at the same time, we will, as we have done in regard to all the foregoing presentations, give the arrangements adopted by various other authors, for the benefit of the student.

Baudelocque makes the heel the distinguishing part of the foot, and the acetabula, pubis and sacrum the points of the pelvis to which they present. He makes four feet presentations, and arranges them according to the frequency of their occurrence.

TABLE OF FEET PRESENTATIONS.

Baudelocque. { 1. Heels to the left acetabulum—called, left calcaneo-cotyloid.
 2. " " right " " right " "
 3. " " symphysis pubes " calcaneo public.
 4. " " sacro-vertebral angle " calcaneo-sacral.

Gardien and Dewees. } Four presentations, same as Baudelocque.

La Chapell. { 1. Loins to the left, called left lumbo-iliac.
2. Loins to the right, called right lumbo-iliac.
3. Loins to the front, called lumbo-pubic.
4. Loins behind, called lumbo-sacral.

Velpeau.	1. Calcaneo, anterior position. First variety. Loins in front and towards the left. 2. Calcaneo, anterior position. Second variety. Loins in front and towards the right. 3. Calcaneo, anterior position. Third variety. Loins directly in front. 4. Calcaneo, posterior—includes all cases where the dorsal surface of the foetus looks towards the posterior half of the pelvis.
Moreau.	First position—Left calcaneo-ileum. Second position—Right calcaneo-ileum. Third position—Calcaneo-pubic. Fourth position—Calcaneo-sacral.

From the foregoing classifications it will be observed, that the principal marks of difference between them consists in the nomenclature employed. All the authors recognize the four presentations; all make the heels or dorsal surface of the body the distinguishing parts, and the iliac, pubic and sacral regions of the pelvis the points to which the heels or posterior aspect of the foetus presents. Thus adopting the classification of Baudelocque, with, in some instances, but slight differences of position.

In feet presentations we have all the delays incident to those of the breech, while the dangers to the child are materially enhanced. The dilatation of the os uteri is more tardy in breech than in vertex presentations, and still more tardy yet in presentations of the feet. The increased danger to the child in the latter is, no doubt, mainly due to the delay in dilating, and the difficulty usually encountered in disengaging the head and pressure upon the cord during its retention. The feet sometimes engage in the os as soon as the dilatation is sufficient to permit it, and at the lower extremities are driven through it like a wedge, by the force of the uterus acting upon the body. In this way the os is forced open mechanically, to a certain extent, but the excitement induced by this mechanical force applied to it, interferes with its physiological dilatation, mainly causing the delay incident to the condition.

The squeezing of the abdomen, as it passes through the imperfectly dilated os uteri, and the displacement of the viscera, to which Velpeau attaches so much importance, as the frequent cause of the death of the foetus, in feet presentations, we conceive to be more imaginary than real, as the degree of dilatation, as we have elsewhere remarked, that will admit of the passage of the pelvis will admit of a safe transit of the abdomen, the diameters of which do not greatly exceed those of the pelvis, while its compressibility

is much greater, affording it an easier and quicker passage than the pelvis.

SECTION II.—THE FIRST FEET PRESENTATION.

This is where the heels are behind the left acetabulum, and the toes looking towards the right sacro-iliac junction. The position of the body is precisely that which has already been described in the first breech presentation.

It occurs much more frequently than either of the other presentations of the feet. According to Madame Boivin, in 234 labors by the feet 135 were the first presentations—or nearly 5.8 per cent. of the whole. The heels, which, before the membranes are ruptured, are firmly pressed against the nates, with the feet flexed upon the legs, do not generally engage in the superior strait until the waters are discharged, and occasionally not until sometime after. When the os uteri is amply dilated, soft and yielding at the time of rupturing of the membranes, the feet and legs often pass rapidly through the os uteri, as though they were carried down by the current of waters that are discharged with great force, when the membranes rupture during a strong contraction. If the membranes rupture prematurely, and the os uteri is but partially dilated, rigid and unyielding, the feet are slow to engage and advance very tardily, being impelled forwards by the contractions, and resisted by the rigid os uteri.

After the disengagement of the feet and legs, which come down with the heels and posterior aspect of the extremities towards the left thigh, the mechanism of the labor is precisely the same as the first breech presentation, and is consummated in the same manner. To detail the process here would be only to repeat what was said in reference to that presentation.

In the remaining three presentations of the feet, the lower extremities are disengaged as they are in the foregoing case, after which the mechanism is the same as that in the corresponding presentations of the breech, and the labors consummated in the same manner as those already described, when considering those presentations.

On account of the sameness of these presentations with the corresponding ones of the breech, after the descent of the feet

and legs, a detailed description of each is deemed unnecessary, as it would be but a repetition of what has been already presented, and would be a needless tax upon the time and attention of the student; all that is needful to state, therefore, is briefly to define the remaining presentations, give the comparative frequency of their occurrence, and refer to the corresponding breech presentations for the mechanism and mode of delivery of each.

SECTION III.—THE SECOND FEET PRESENTATION.

This is distinguished by the heels being behind the right acetabulum, and the toes towards the left sacro-iliac junction; the position of the body corresponding with that of the second breech presentation.

In 234 feet presentations, according to Boivin, 86 were the second, or about 3.6 per cent. In 37,899 labors, according to Madame La Chapell, there were 175 of the second presentation of the feet, or about .46 per cent of the whole.

After the escape of the feet and legs, which descend with the heels, and posterior aspect to the right thigh, the labor is amenable to the mechanism of the second breech presentation, and is terminated in the same manner.

SECTION IV.—THE THIRD FEET PRESENTATION.

The heels are here found behind the symphysis pubis, and the toes directed towards the sacro-vertebral angle—the position of the body corresponding with that of the third presentation of the breech. In 489 labors, with feet presenting, according to Boivin and La Chapell, 13 were of the third presentation, or 2.6 per cent.

After the descent of the feet and legs, which is with the heels and posterior aspect, at first directly before, but after the rotation of the hips, turn to either the right or left side, as the hips rotate to the right or left, the labor is amenable to the mechanism of the third breech presentation, and is terminated in the same manner.

SECTION V.—THE FOURTH FEET PRESENTATION.

The heels in front of the sacro-vertebral angle, and the toes towards the pubis, constitutes this presentation, in which the foetus

maintains the same relative position that it does in the fourth presentation of the breech.

In 772 feet presentations, according to Boivin and La Chapell, there were 16 of the fourth, or about 2 per cent.

After the delivery of the feet and legs, which descend with the heels and posterior aspect directly backwards at first, but turn to the right or left side, as the hips rotate to the right or left as they engage in the inferior strait, the labor is amenable to the mechanism of the fourth breech presentation, and terminates in the same manner.

CHAPTER VII.

PRESENTATIONS OF THE KNEES.

THE presentation of the knees is of very rare occurrence; many accoucheurs pass through a long life of obstetrical experience without encountering a single case. But the rareness of their occurrence is no reason that they should be neglected, or that they should not be studied and understood. If they are never met with, there is no loss sustained by understanding them. But if they should be encountered, and not understood, there might arise a very serious loss to both patient and practitioner; the former might lose her child, or her own life, and the latter much reputation.

According to Madame Boivin, in 20,517 labors, there were 4 instances of knee presentations; and according to Madame La Chapell, in 22,243 labors, there were 9 cases of knee presentations.

They are, evidently, accidental displacements of the lower limbs in breech or feet presentations, during the early progress of the labor, either before the passing off of the waters or during their discharge; an excess of liquor amnii would afford ample room for such a displacement, and an irregularity in the uterine contractions might easily produce it; or, where there is a sudden and powerful rush of the waters, where they are in excess, the knees,

instead of the feet, might be carried down to the os uteri in the current; or almost any other accidental occurrence might contribute to such a displacement under favorable circumstances.

Both knees sometimes present at the os uteri at the same time; but more frequently theré is but one. The presentation usually occurs before the os uteri is perfectly dilated, which renders a satisfactory diagnosis rather difficult. As soon as the opening becomes sufficient to admit the finger and allow of an ample exploration, if both knees are present, they can be distinguished from any other part of the body by their similitude and their roundness and hardness. If but one presents, it may be distinguished by the two latter qualities, and by passing the finger round into the fold of the flexed joint or popliteal space, and by tracing the leg down to the foot, the presence of which will be conclusive as to the character of the presentation. In order to reach the foot a very great degree of perfection is needed in the dilatation or relaxation of the os uteri.

Dewees considers these less favorable than any of the natural presentations, while Velpeau says "it is entirely wrong to attribute more danger to delivery by the knees, than to those that take place by the feet." All things being equal, we cannot see why the presentations of the knees should be more difficult or dangerous, to either mother or child, than those of the feet; aside from the accidents to which they are, perhaps, more exposed, on account of the knees catching upon the brim of the pelvis, and other mal-position to which they may be liable, we should regard them even more favorable than the feet presentations.

The tibiæ, or tibial ridges, are the parts that determine the different presentations of the knees, and the four points of the pelvis, designated in breech and feet presentations, are those that distinguish them.

All the authors cited in reference to the various presentations, agree in assigning to the knees four different ones, and each writer uses the same classification in regard to them that is employed in reference to the feet; let the tibiæ be substituted for the heels, and they are identical. Baudelocque, for instance, describes four presentations of the knees, and arranges them as follows:

1. Front of the tibiæ at the left acetabulum, called left tibio-cotyloid.
2. Front of the tibiæ at the right acetabulum, called right tibio-cotyloid.
3. Front of the tibiæ at the symphysis pubes, called tibio-pubic.
4. Front of the tibiæ at the sacro-vertebral angle, called tibio-sacral.

As a corresponding degree of sameness between the presentations of the feet and knees is maintained uniformly by the authors, it is deemed wholly unnecessary to multiply the instances of correspondence by repeating their classifications here.

After the legs are disengaged from the os uteri, the presentation is converted into a corresponding one of the feet; and let it be whichever one it may, the labor is amenable to the mechanism of the same presentation of the feet or breech, and must be subject to a like termination. When uncomplicated, all labors by the knees are clearly eutocial, being susceptible of a spontaneous conclusion.

"Baudelocque directs that we should not search for the feet in these presentations, unless the labor be complicated by some accident; while Dewees thinks it the better practice always to bring down the feet, especially in the earlier part of the labor, when neither force is required, nor inconvenience hazarded by the proceeding." (*Deweess' Midwifery.*)

When the os uteri is favorably disposed, and the pains regular and efficient, the interference recommended by Dewees is not only needless, but frequently mischievous, as it is apt to result in complications, which might be avoided should the labor be allowed to progress undisturbed. Circumstances may arise in these, or any other presentations, which may so complicate the labor, as to render assistance necessary; such are instances of dystocia, to be considered hereafter.

CHAPTER VIII.

MANAGEMENT OF AND CONDUCT DURING LABOR.

THE student having studied the principal phenomena pertaining to parturition, is now prepared for an introduction into the lying-in

chamber, and for an acquaintance with the duties that await him there.

Though the inferior animals generally bring forth their young without assistance; and the women of some countries, yet in a primitive state of civilization, imitate their example, and appear to suffer no more than they ; and occasionally isolated cases occur in our midst, that seem to vie with them, both in their indifference to the sufferings and risks of parturition, and the claims of a refined conventionalism ; yet these instances afford no valid reason why society should in this respect, more than any other, retrograde toward barbarism, and assume the habits of beasts and savages, rather than maintain their present state of advancement, or indeed progress still further in those matters that contribute to their comfort and safety in the hour of "nature's greatest extremity." Neither because parturition is a physiological process, capable of self-termination, should woman be neglected at these, the most trying seasons of her life, and be deprived of that aid, which science alone can afford her ; for, under the most favorable circumstances of a civilized, Christian birth, can the conscientious accoucheur afford such assistance and comfort, that renders his presence not only agreeable and desirable, but often absolutely necessary to her safe and easy delivery. Even where drugs, or interference is not indicated, it is a part of his professional duty, to inspire the patient with courage to bear her suffering heroically and patiently, to give a comforting word, and to strengthen her resignation to submit to the operations of the laws of her being, to allay her fears in regard to the future, and by kindness and sympathy support her flagging spirits, and enliven within her a sense of duty in regard to herself and offspring. And when difficulty or danger threatens, by his presence and skill he may avert it; and when either obtains, to neutralize its power by the application of science and experience.

A great deal of judgment and address are often necessary to control the management of the lying-in room.. It frequently requires a good share of both, to appease the alarm and gloomy forebodings of the patient, and the fears and anxieties of the friends or attendants. Whether there be any real danger or not, there is often a great deal of perturbation among the timid and nervous relatives, especially in the first labor. There are often the father,

mother, sisters and husband, in the house, all of whom show their agitation by their frequent visits to the parturient department, and manifest their anxiety by their frequent kisses, their expressions of sympathy and tenderness to the patient, and their earnest inquiries of the accoucheur, concerning the probable result of the case. As the labor progresses, and the sufferings of the patient become more and more intense, these family agitations increase into alarm, and even despair; and, in the accoucheur are centered all their earthly hopes for the deliverance of their dear one from the jaws of death, from which fate, in their apprehension, they can see no chance for escape.

If the medical attendant possesses the power of inspiring the confidence of the patient, and those surrounding her, he can relieve himself of a heavy load of perplexity and annoyance, which must otherwise be very oppressive.

The conduct and general deportment of the accoucheur in the lying-in room, has much to do in establishing that confidence which is so essential to the comfortable and unrestrained performance of his duties. Upon entering the room, he should preserve his natural bearing, pass the compliments of the day in his usual free and easy manner, ; he should neither assume excessive politeness, nor appear rough nor waggish. He should be as genial and cheerful as his nature, and the circumstances of the occasion, will justify, but levity and airiness should be avoided. It might appear unnecessary to caution a well-bred gentleman, in regard to the correctness and purity of his conversation, and in the presence of women more especially, but many times, when matters are progressing favorably, and all present are in good spirits, and fine humor, these kind lady friends of the patient, who have been honored with an invitation to be present, and who are usually very circumspect in regard to their language, feel as though the occasion warranted them in indulging in remarks and inuendoes that at other times and under other circumstances, they would consider rather vulgar. Especially after a favorable termination of the labor such remarks are thought to give spice to these ovations of Lucina, and are enjoyed with a peculiar zest, and the doctor is expected to participate in the smutty entertainment, and contribute his share towards the enjoyment, which often excites the disgust of the patient, and depreciates all parties

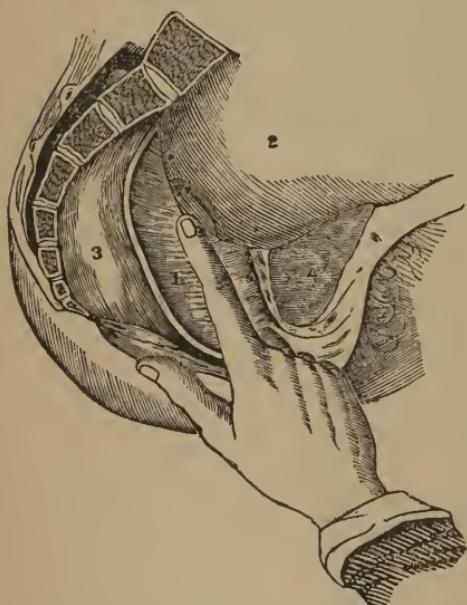
in her estimation, because she is in no condition to enjoy either the ludicrous stories that are often told, or the offensive jests that are indulged in. These things may be relished by some, even in the puerperous state, while to others they are exceedingly unsavory and revolting, and should be sedulously avoided by every accoucheur who has any respect for the object of his care, the dignity of his profession, or his own reputation. Directly after being seated, and passing the usual common-place remarks of the day, he should inquire of the patient—if the labor be yet in the dilating stage—concerning her health, how long she has been sick, if the pains recur regularly, if they are increasing in severity, etc. His manner of addressing, and conversing with the patient, should be free, but void of forwardness, or the appearance of indifference; his whole bearing and conversation should be such as to make her feel that he is really interested in her case, and desirous for her speedy and safe delivery. During his conversation with the patient, nurse or attendants, he should keep an eye on his patient, and watch her movements; if he observes that she gives frequent manifestations of pain, by twisting or moving herself upon her chair, contorting her face, putting her hand to her back, etc., or, if walking the floor, she frequently stops to lean upon the back of a chair, the bed-post, or seize upon the arm of an attendant, or in any other way manifest the presence of pain; and if he perceive the pains are increasing in frequency and severity, it becomes his duty to suggest the propriety of making an examination whether there be a show or not. If the patient be young, and in her first labor, it will be more congenial to her feelings to make this suggestion to, and the inquiry whether the “show” be present or not, of the nurse, if present, or her mother, or nearest friend, aside, and have her to make the communication, and obtain her consent. When the woman has borne other children, this precautionary measure may not be necessary, but the suggestion may be made to her directly.

The necessity of the examination at this period consists in the importance of being made acquainted with the condition of the os uteri, in regard to its dilatation or rigidity, the state of the vagina and external organs, with a reference to their relaxation or otherwise, and the character of the presentation, whether it be cephalic, pelvic or transverse.

The examination must be proceeded with according to the directions given for touching, in a previous article, (page 344). The time for touching, in the early stage of labor, is during a pain, though some authors direct that the interval between the pains should be selected for the introduction of the finger; the time of pain is preferred, because the mind of the patient is, at that instant, directed from the operation, and the dread of being handled by a stranger, which is often the most severe part of the trial to a young and sensitive woman, is averted, and relief from this mental suffering afforded. And another advantage is, that the os uteri can be more easily discovered by the inexperienced practitioner, during a pain than in its absence, and its condition at that time ascertained. Should the pain pass off before a satisfactory result be attained, the hand should remain unmoved, the finger occupying the vagina, until the recurrence of the pain, when the exploration should be

recommenced by passing the finger around over the head, the hard globular body, that will be found about the superior strait, either at, or above. it. Somewhere on this presenting globe will be found the os uteri, distinguished from the adjoining structures by the presence of a ring or circular opening of greater or less dimensions, and hardness. Fig. 91. Having gained this point, the finger is carefully introduced into the os, and passed around its circumference, with a view of ascertaining the extent of the dilatation, and the condition of the structure, in relation to its softness or rigidity. Having

FIG. 91.



1. The Vagina. 2. The Rectum. 3. The
Uterus. 4. The Bladder.

ascertained these two important points, during the pain, the touch is continued until the succeeding interval arrives, when the manœuv-

vre with the finger should be repeated so as to ascertain the size and condition of the opening in the absence of pain, after which the hand may be removed and the patient permitted to resume her previous position or occupation, provided the labor is not found to be too far advanced, to allow of its being done with safety.

The first important point gained by the examination is to ascertain whether labor has actually commenced, or all parties have been deceived by the presence of "spurious or false pains,"—a species of neuralgic pains, described in a preceding article, page 452. If the os uteri be found undilated, or but slightly opened, and no impression be made upon it, or the ovum, often within reach of the finger, by the pains, and no "show" be present, the pains that have been annoying the patient for several hours, are no other than "*false or spurious*" ones, and are amenable to the following treatment.

Have the patient keep her bed, and administer the following every hour or two, as the urgency of the case may require:

R. Morphia sulph.,	grs. i.
Tinct. belladonna,	f <small>z</small> ss.
Aqua camphora,	3ij.

M!

Should the bowels be constipated, the employment of this anodyne solution should be premised by the exhibition of some cathartic, or an evacuation of the bowels by an enema, after which the preparation should be given as directed. This simple course will generally suffice to arrest the pains, and restore to the patient all the comfort her condition will permit her to enjoy. After one of these attacks of false pains, near the close of gestation, it is generally expected the woman will go about two weeks longer, before actual labor sets in. These neuralgic pains may be dependent upon the recession of the uterus, which marks the commencement of the first or preparatory stage of labor, that often occurs about the middle of the eighth month.

If, on the contrary, the examinations reveal a greater degree of dilatation, with a considerable amount of rigidity in the absence of the pain, and a perceptible increase of hardness during its presence, with a tension of the membrane, and an increased secretion of mucus, or the "show," the assurance is that actual labor

has commenced, that is in the second stage, or stage of dilatation ; that by comparing the state of advancement with the length of time since the first pain was felt, the evidence will be that it is progressing slowly, and that the continued presence of the accoucheur is not necessary. Under such circumstances he will be at liberty to retire from the room, for a short time, to attend to what urgent business may require his presence in the neighborhood, but he should repeat his calls often, to keep himself advised of the progress of the labor.

In case the os uteri be found largely dilated, or soft and dilatable, with the membranes protruding, or strongly pressing against the interior margin of it during the pain, and the vagina and external organs relaxed, the accoucheur may be satisfied, especially if the pains be regular and act efficiently, that the labor is pretty well advanced, and is progressing rapidly, and that the time is near at hand when his entire attention may be required. These conditions demand that no time should be lost in making the necessary preparations for the accouchment. These pertain both to the woman's person and the parturient bed.

The preparations necessary for the woman, consist in the proper arrangement of her dress. In order to prevent the undue exertion often incident to changing after delivery, when she may be greatly exhausted from the severity or duration of the labor, or inclined to flooding, or to faintness, she should be attired in the clothing she intends wearing after her accouchment, which should consist in the chemise, bed-gown and stockings ; the two former should be rolled up smoothly under the arms, to prevent them getting wet, or being soiled by the discharges ; after these are properly arranged, a quilted skirt should be slipped on and loosely fastened around the waist, or a sheet, folded several times, should be pinned around her, to receive whatever may escape during the delivery. Thus prepared, she can take her position on the bed for the final struggle.

No preparatory arrangement of the clothing or bed is necessary for the examination, but both may remain as they are ordinarily used.

The bed upon which the woman is confined, is denominated by various titles, as the *bed of child-birth*, *lying-in bed*, *bed of labor*, *bed of pain*, *bed of misery*, *little bed*, etc.

In some lying-in institutions, and some private families, also, a bed is provided for the especial purpose of being delivered upon; sometimes it is brought into the ward or room which the woman expects to permanently occupy during her confinement, and after being used, and the woman removed from it to another one, it is again taken out. Others, again, have a particular room, as well as a bed, in which to be delivered, and after it is over the woman is removed to the one she is permanently to occupy. This arrangement is more frequently adopted in public institutions, where there are a number of women confined in the same ward, in the presence of whom it is not considered proper for a delivery to take place. It may be more convenient under such circumstances, to have a particular room for the purpose ; but there is no doubt often much mischief risked, if not done by thus transferring the newly-delivered woman from bed to bed and room to room ; the greatest danger perhaps attending these migratory feats, is the liability of exciting hemorrhage, as it is no unusual thing for this result to attend even trifling movements of the body, such as shifting the position, turning over, etc., for many hours after the birth of the child. And even if there should be manifested no disposition to flooding, the woman is usually so overcome with fatigue and exhaustion, that she would much rather be allowed to remain quiet and at rest than to be annoyed and disturbed by being moved.

The accoucheur should make it one of the most prominent points in directing the preliminary arrangements for delivery, that there should be as little necessity for disturbing or moving the patient afterwards as possible, and to this end we recommend the same bed and same room, in which she may be delivered, be occupied by her afterwards.

As the result of the examination admonishes the accoucheur that the labor is progressing rapidly, and that there is no time for delay in completing preparations for the delivery, he will proceed to instruct the nurse how to arrange the bed so as to prevent it from being soiled, and make it as comfortable for the patient as possible, and as convenient for himself as its position in the room and the arrangement of the furniture will allow. A mattress is far preferable to feathers as a lying-in bed.

After observing that the bed stands in a position convenient for

him to sit with his right hand to one side of it, if he uses the right hand, or, if he be left-handed, the left hand towards the bed side, he will direct that all the bed-clothes be removed—even the under sheet—and in the centre of the bed place a sheet so folded as to be about a yard square. This is designed for her to lie upon permanently after she shall have been put to bed, and to protect the bed from being soiled by the lochial discharges; over this the under-sheet is to be spread; upon this sheet is to be placed a gum blanket, or a soft, pliable oil-cloth, about a yard and a half square, so near the edge of the bed that it may come entirely over its side so as to protect the tick entirely from the discharges that may accompany the delivery; this gum blanket, or oil-cloth, being impervious to the escaping fluids, will afford a thorough protection to the sheet over which it is placed, as well as the bed or mattress beneath it; over this gum blanket is to be placed a quilt or light comfortable, so folded as to be of the same size as the blanket or oil-cloth; this is for the purpose of absorbing the fluids, that otherwise would run off the impervious surface of the gum or oil-cloth, perhaps on to the bed, or the carpet upon the floor. Where the precaution of placing this folded quilt or rug, or whatever may be used over the oil-cloth, has been neglected, we have seen both bed and carpet thoroughly saturated with the discharges, and the object of the employment of the impervious material completely defeated. The oil-cloth and quilt must be placed between the middle and foot of the bed, lengthwise. After this is properly arranged, the woman is to be placed upon it so that her feet can come against the bed-post and her body lie diagonally across the bed, and her hips as near the centre of the oil cloth as possible, taking care that they be not at so great a distance from the edge of the bed as to be inconvenient to the accoucheur. She should be placed on her left side, with the trunk bending forwards, so as to bring its axis as near in the direction of the axis of the superior strait as possible, and the thighs flexed upon the abdomen, and the legs upon the thighs; this position will bring the head and shoulders a little above the centre of the bed and towards the opposite side, where they must be raised by pillows. This is what is termed the obstetrical position, and is to be maintained until the close of the labor; a temporary change of position may be allowed occa-

sionally, should the labor be protracted and the woman complain of being fatigued by lying so long in one position.

If there has been no gum blanket or oil-cloth provided, one or two thick comfortables, folded several times, will answer for a substitute, but they are not so good.

After the woman is placed upon the bed for delivery, if the weather be cold she should be covered sufficiently to keep her warm ; if no covering should be required, on account of the warmth of the weather or room, a sheet or light spread should be thrown over her, to prevent exposure.

Every well educated accoucheur will understand the propriety of conducting all his manipulations under cover, as the sense of vision cannot be made available either to his advantage or that of the patient. In an ordinary labor, there is no necessity of exposing any part of the woman's person, not so much as her ankles even. And any man who would so far violate every sense of decency and manly decorum, as to take advantage of his position, or the situation of his patient, who has confided in him, as to wantonly and lecherously subject her to unnecessary visual exposure, at a time when she is defenceless, and at his mercy, is the most unfit for his calling, and richly merits the scorn and condemnation of every honest man and decent woman in the community.

It will frequently occur that by the time the accoucheur arrives, the child will have been born, or the labor so far advanced, that there will be no time for making the necessary preparations, as above described. He will often find the woman already, or about to be delivered in her ordinary wearing clothes, and perhaps lying on the floor, or lounge, or upon the bed, with all the bed-clothes under her in the most uncomfortable and unseemly condition. Under such circumstances he must act according to his best judgment, always keeping in view the importance of her avoiding any more exertion than is absolutely necessary in being put to bed.

It is usual, after the examination, for the patient and attendants to question the accoucheur, in regard to the probable duration of the labor, and press him for an opinion. As much as we admire candor, and insist upon its being practised by the physician toward his patient, ordinarily, such questions, at such times, must be answered evasively, for it is impossible for any accoucheur to make

a certain prognosis in regard to any case of labor, especially while it is yet in the stage of dilatation. It may be protracted very much longer than he may think he has reasons to believe it will be, or terminate much earlier than he may have anticipated. There are so many contingencies and so much uncertainty connected with the parturient function, that it is never safe to venture an opinion in regard to the probable time of its termination. It may occur, as it has often done, in the experience of an accoucheur, that the prospects of a speedy delivery, may be such as to warrant a very favorable prognosis, but in the progress of the labor, some unlooked for circumstance may occur, as a suspension of the uterine action, or the head may become obstructed in its passage, or the os uteri may not dilate perfectly, from the presence of a scirrhouss or fibrous thickening of the os or cervix, or from some other cause, that will protract the labor many hours beyond the anticipated time of its termination. The answer to all such questions should be, that all things appear to be favorable, and there is no reason to believe that it will not be over in due time; that the labor is progressing very well; that if the pains continue active and efficient, it will not last a great while longer, etc., etc. But he should never allow himself to be thrown off his guard, so far as to make a promise that it will be over at a certain time, notwithstanding how favorable the prospects may appear, to render the fulfillment of such a promise certain. We can all bear uncertainty, in regard to the termination of suffering, better than disappointed hopes.

All ceremony and display, other than that sanctioned by decency and decorum, should be banished from the lying-in chamber. No gentleman with education and politeness above a Moore, would think of abandoning his self-respect, and disregarding the feelings of his patient so far, as to remove his coat and roll up his sleeves, while giving attention to an ordinary labor. A man of decency and proper feelings, will be careful to conceal as much as possible his hands, even, when blood stained, instead of exposing his bare arms, all smeared with blood, to the full gaze of the heart-sick patient and disgusted attendants. Such a display is far better adapted to the slaughter-house than the lying-in room, and it is indicative of the mind of a vulgar, low-bred ruffian. Where bloody operations are to be performed, a needful precaution is necessary,

to prevent the clothes from being soiled, but this can be much more effectually done, by putting on a long black sleeved-apron, than exposing the bare arms to the affrighted patient. By a little care, as turning up the coat-sleeves, and this should be done under cover, and proper address, all the duties of the accoucheur can be discharged in an ordinary labor, without incurring any risk of having his clothes spoiled, or gaining the reputation of an unfeeling butcher.

No honest, well educated accoucheur would consent to practice minor tricks, for the sake of appearing consequential, as boasting of his superior skill, displaying his instruments, etc., in the lying-in room, any other or such acts of buffoonery. His aim would be to avoid saying or doing any thing calculated to disturb or excite the mind of his patient. He would know that where the labor is progressing normally, and where every thing is in a favorable condition, there is but little for him to do, other than what his presence, counsel and kindness can accomplish. He would know that by unnecessary intermeddling, much more harm than good might be produced, and hence he would avoid officiousness. He would know when and how to act for the benefit of his patient, he would therefore avoid worrying her by untimed and needless interference, or disheartening her by apparent or real neglect. He would endeavor, in a quiet, gentlemanly, unpresuming manner, to faithfully discharge his duty, his whole duty, and nothing more.

SECTION I.—DUTIES TOWARDS THE WOMAN. RUPTURING THE MEMBRANES, ETC.

At the close of the second stage, which may have been of longer or shorter duration, as announced by the full dilatation of the os uteri, or a soft and dilatable condition, and the necessary preparations having been made, both as regards the woman and bed, as above directed, and the woman placed in position for delivery, the accoucheur should take his seat by the side of the bed, so that the hand he intends using shall be towards the patient. Here is afforded an opportunity for the exercise of judgment and discretion, in reference to rendering assistance in eutocial labors, and to what extent such assistance may be rendered without incurring the charge of undue officiousness. It has been elsewhere intimated, page 464, that aid is not to be withheld, when it can be benefi-

cially employed, because the labor is capable of spontaneous termination, but that it is the duty of the accoucheur to exercise his best judgment in mitigating the sufferings of his patient, as far as possible, and aiding their termination as speedily as the safety of both mother and child will permit.

Being thus seated, he will, during a pain, repeat the examination, to ascertain more particularly the condition of the os uteri, and the advancement made by the presenting part. If the bag of waters be found protruding through the fully-dilated os, or by a broad surface pressing firmly against the inner edges of it, throughout its entire circumference, during the pain, the membranes should be ruptured, by pressing the end of the finger forcibly against the presenting part, until they give way, and a gush of waters announces the puncturing complete. A cutting movement, with the finger-nail, is often necessary to effect the laceration of the sack.

We are aware that some very respectable accoucheurs object to the artificial rupturing of the membranes, averring that such a course interferes with the contractions of the uterus, and necessarily protracts the labor. These furnish cases that have occurred in their experience, as confirmatory of the proposition. Every practitioner will agree, that he has met with cases where the operation was followed by such results; but whether the change in the uterine action is caused by the simple rupturing of the membranes, or the passing off of the waters; and whether the same change would not occur, from the spontaneous rupturing of the membranes and escape of the liquor amnii, had they occurred at the time, are questions to be considered.

After the os uteri has become fully dilated, at the time of labor, it is evident that the liquor amnii has fulfilled its whole mission, and its discharge constitutes a part of the process of parturition. This discharge can only be effected by a previous rupturing of the membranes that contain it. It is also evident, from universal observation, that the membranes do not uniformly yield to the contractions, so far as to give way, simultaneously, with the full dilatation of the os, but that this sometimes occurs several hours before the dilatation is complete; and again, that it does not take place for a long time after that event; indeed, it occasionally happens that the bag of waters protrudes through the external organs,

and even that the ovum is expelled entire, with the child enclosed, surrounded by the waters of the amnion ; and that it is only saved from perishing, by immediately opening the sack and removing it. While the spontaneous rupturing of the membranes, simultaneously with the perfect dilatation of the os, is the rule, and that it obtains in a very large majority of cases, the deviations from it, constitute exceptions, which are due to the accidental variation in the thickness and strength of the membranes, that sometimes they are so thin and delicate, that they cannot withstand the first feeble contractions, but give way before the dilatation has made any perceptible progress towards completion. When the rupturing is delayed for a long time after the dilatation is perfected, the membranes are unusually thick and strong, so much so as to resist the strength of the powerful contractions that force them through the os, vagina, and external organs.

Such being the case, and the discharge of the waters at the termination of the stage of dilatation, being the rule, as a constituent part of the process of parturition, it follows that this exception should be corrected, so as to bring the labor under the general law governing the function, which is done by rupturing the membranes artificially, at the proper time. Now, how the simple act of rupturing the membranes, at the time when they should have, and would have ruptured naturally and spontaneously, had not their thickness and strength been excessive, can influence the functions of the uterus to the extent of arresting or modifying the contractions so far as to suspend the labor for several hours, the objectors to this manœuvre have not informed us. That a suspension does occasionally take place, under such circumstances, is readily admitted. But that it is caused by the simple act of rupturing the membranes, is very far from being conceded. We can see no cause why the same result should not follow a spontaneous rupturing of the membranes, should it occur at the proper time, instead of being ruptured artificially. The effect of modifying the action of the uterus is more probably produced by the evacuation of the waters, and that the same result would follow that event if it had succeeded a spontaneous rupturing of the membranes. We have frequently witnessed a similar result after such rupturing. It is well known that a temporary suspension of

the pains, lasting a few minutes, almost always follows the evacuation of the waters, when it occurs spontaneously. This results from a relaxation of all the fibres of the uterus, occasioned by the sudden escape of the liquor amnii; and during the temporary suspension of the contractions, the uterus is recovering from the sudden relaxation, and gathering its forces, preparatory for the greater efforts that it will be required to make in expelling the foetus. In those cases of delayed action, the uterus is longer in recovering from the effects of the escape of the waters, whether this is effected by a spontaneous or artificial rupturing of the membranes.

The action of the uterus after the artificial rupturing of the membranes is generally imitative of that following a spontaneous rupturing, notwithstanding a different result is occasionally met with; but this should not deter the accoucheur from acting promptly, when he is convinced that the conditions warrant such interference, for many hours of suffering are often saved, by rendering this little act of assistance, at the proper time.

After the evacuation of the waters, and the commencement of the third, or propulsive, stage, the character of the pains, and all the phenomena of the labor, present a very marked change, as detailed in the description of the different stages.

Authors differ in their views of the duties of the accoucheur during the more active stages of labor. Some advise that the woman should be left to herself, and teach an exclusive reliance on the powers of the organism. So far as the strictest construction of absolute necessity is concerned, they may be right; but we have always found it more congenial to the feelings of the patient, and more compatible with our sense of duty, to find something to do that has the semblance, at least, of benefiting her. It is our habit to remain at the bedside of the patient pretty constantly from the commencement of the stage of propulsion, until the termination of the labor; and by keeping the finger upon the head of the foetus, or in contact with the os uteri, we are enabled to observe the actions of the uterus, by marking the advancement of the head at each pain; and if they should become tardy or inefficient, excite the contractions, by passing the finger, with a tolerable degree of pressure, around the interior of the os, and thus, by a sort of titillation, arouse the excito-motor nerves to

increased action. This will very often provoke the pains of labor, when the intervals between them are unprofitably long; and impart energy and efficiency to them, when weak and ineffective; and prolong them when too short to be sufficiently efficacious. By this simple manœuvre the accoucheur can very often exercise complete control over the action of the uterus, and require it to submit to his will, to a great extent, and facilitate, strengthen and prolong the contractions according to his pleasure, or the dictates of his judgment. But there are some cases where the sensibility of the uterine nerves is more obtuse, and where this expedient may be practised with but very little effect. The uterine actions are, however, amenable to it in a large majority of cases met with in practice. It is our firm conviction that if this course were more generally pursued than it is, there would be less call for the use of instruments than there appears to be, in the practice of some accoucheurs, and we would hear less complaint of tardy labors and exhausted women.

After the head has passed the os uteri and engaged in the vagina, if the pains are still inefficient, short and far apart, they can be improved by the same means, applied to the internal surface of the vagina, and after it has rotated, and the occiput presents under the arch of the pubes, the same movements of the finger applied to the vaginal orifice, will continue to excite the uterine contractions, for the vaginal nerves now become the exciters of the motor actions of the uterus. During this descent of the head, through the pelvic straits, when the foregoing course is pursued, the woman will frequently complain of the manipulation, stating that it makes the pains worse; as this is the object in view, such complaining is the best encouragement we can have for continuing it.

In conducting the labor upon this plan, the effort should be to imitate the normal action of the uterus in every respect; the pains should not be made to continue too long, without intermission; the intermission should be allowed to continue about the usual length of time that is observed when the uterus is capable of affording sufficient contraction to effect delivery in due time, spontaneously, and the judgment must be exercised, in regard to the strength of the pains induced, this should not be too great at first, but gradually increased, as the labor approaches its termination, as the last or

expulsive pains are always the hardest and strongest of any engaged in the process. The strength of the pains is in proportion to the amount of pressure made by the finger, upon the parts acted upon, and the rapidity of the motion over the part upon which the pressure is made.

Where the pains are strong, regular and efficient from the commencement of the propulsive stage, and the labor is progressing with corresponding rapidity, the course of action just described is unnecessary; here the principal duty of the accoucheur, is to repeat the vaginal examinations from time to time, with a view of ascertaining the progress of the labor, and encourage the patient, by expressions of hopefulness, that her sufferings will soon be over, etc. During the progress of the labor, from the sympathetic irritation of the bladder and rectum, there will be frequent inclinations to get up; the thoughtful accoucheur, anticipating those feelings of his patient, will absent himself from the room from time to time, for a few minutes, to give her an opportunity to respond to those requirements of nature; but after the head becomes fully engaged in the cavity, and is presenting at the inferior strait, this desire to leave her bed must be discouraged, and every attempt to do so persistently interdicted, for the foetus might be expelled while she was standing, or sitting on the chamber, in either case it would be very undesirable. The preparation of the bed will be sufficient to protect it against injury from the discharge of urine, and a cloth should be placed so as to receive the faecal discharges, which can be immediately removed.

If, upon making the first, or any subsequent examination, during the dilating, or early part of the propulsive stage, the rectum should be discovered to contain an accumulation of hardened faeces, it should be promptly removed by means of an enema, and if the first should fail in doing it, it should be repeated two, three or more times until the end be accomplished; for it is much better to have the rectum evacuated now, than to subject the woman to the mortification, and the accoucheur to the inconvenience incident to an involuntary discharge at the last moments of the labor.

After directing an enema for this purpose, the accoucheur should not absent himself from the house, until after its operation, for sometimes the reflex action upon the uterus is so great, as to cause

an almost instantaneous expulsion of the foetus, attended with the most disastrous consequences. We knew of a case, under the charge of a neighboring accoucheur, where an injection was ordered, under such circumstances, after which the gentleman returned to his office, which was not more than fifty rods from the residence of the lady, the enema soon operated, simultaneously with which the foetus and placenta were expelled in the vessel upon which she was sitting; the most terrific hemorrhage accompanied the expulsion of the uterine contents, and the patient died before the doctor could reach her chamber. The gentleman informed us that at the time the enema was ordered, the dilatation of the os uteri did not exceed one inch in diameter, and was quite rigid. Although a man of extensive obstetrical experience, he assures us that he had never witnessed an instance of such violent uterine action before.

When there is an accumulation of urine in the bladder, and the patient is unable to void it, from any cause, the catheter must be employed to remove it.

Though it is the duty of the nurse to have all things in readiness as the ligature and dressing for the cord, a supply of warm water on hand, a bottle of tincture of camphor, or some smelling salts, etc., and know where to find the bandage for the woman, the clothes for the child, etc., etc., yet these duties are often neglected until the moment the articles are needed, when the woman, weak and exhausted, has to be annoyed by inquiries, as to the whereabouts of each article, or be disturbed by the confusion occasioned by searching for them. The accoucheur should see to it in time, so that this annoyance and disturbance may be avoided as far as possible. He should also see that a good supply of cloths are provided for his own use, during the delivery, some half a dozen napkins, at least, should be placed within his reach; they should be tucked in under the bed-clothes, or mattress, so that he can lay his hands upon them the moment they are needed, without inquiring for them, or troubling any one to hand them to him. If hemmed and finished napkins are not provided, an old worn-out sheet, or under-garment, may be torn into cloths of proper size, which will answer every purpose. These will be needed for wiping hands upon, to apply to the woman, etc., etc.

The hygienic arrangements of the apartment, which should be as

far from the noise and bustle of the street as possible, and duties towards the patient, are of too great importance to be overlooked by the accoucheur. The ventilation and temperature of the room should be regulated according to the season of the year, and state of the weather. During the progress of the labor, the room should be neither oppressively warm nor uncomfortably cold. It should be ever borne in mind, that the exertions of the patient render her much more sensitive to the heat, during her travail, than her attendants are; a temperature that is but pleasant to them, is often oppressive to her; *her* comfort, convenience and health, are first to be considered, and the warmth of the room, when it can be controlled, must be regulated to comport with her convenience. The ventilation should be such as to keep the atmosphere as pure as possible, and to this end, all matters that would tend to vitiate it, and all strong odors, should be speedily removed from the room, and cleanliness, as far as possible, preserved.

Her diet during the hours of her travail, at which time she will desire, nor need but little, should be of the blandest and most unirritating kind, and her drinks entirely void of stimulus. Cold water constitutes the most grateful and beneficent beverage she can have, and with this she may be liberally supplied. The prejudice against the use of this natural drink, upon such occasions, is fortunately, for the comfort and benefit of the patient, rapidly receding before the advancement of a more rational custom.

The recital of unfortunate cases, or melancholy and depressing events, in the presence of the patient, should be scrupulously avoided, and such conversation indulged in, as is calculated to encourage her, and inspire her with confidence, in a favorable and happy termination of her case.

After the head has passed the vulva, it should be supported upon the hand of the accoucheur, if the body be not expelled by the same contraction, until another pain comes on, which usually completes the birth of the child. During the interval between these two last pains, while the head remains without the vulva, and the body within, there should be no traction made upon the head, nor efforts to disengage the shoulders; but the last expulsive effort, which consummates the work, should be patiently waited for, as such interference at this point can be of no advantage, provided the uterus retains its integrity.

SECTION II.—SUPPORTING THE PERINEUM.

It has been the custom of authors, from time immemorial, to attach great importance to supporting the perineum, while the head and trunk are passing the vulva, to prevent its laceration. The propriety of the manœuvre, in view of its practical utility, has recently been very seriously questioned. As Dr. Tyler Smith has treated the subject more elaborately, in view of its physiological bearing, than any other author we have examined, we shall take the liberty of giving his article entire.

"Laceration of the perineum is by no means an uncommon accident in midwifery. As I have already remarked, it is more frequent in primipara than in subsequent births, while rupture of the uterus is almost always confined to post-primal labors. It generally occurs during the pain by which the head or trunk is expelled through the os externum, and in most it begins at the vaginal margin of the perineum, extending towards the anus, and sometimes throwing the two cavities into one. Occasionally it happens that the rend takes place in the middle of the perineum, the injury being so extensive as to admit of the passage of the child, while the anterior margin of the perineum remains perfect. My able colleague, Dr. Robert Barnes, has made the interesting observation, that a slight laceration of the anterior part of the vagina, similar to that which so often occurs to a small extent in the posterior raphi, is very common in first labors."

"It is generally admitted that the laceration of the perineum occurs from the head passing through the vagina so rapidly, that the perineum has not time to dilate; the accident rarely happens where the labor is tedious or protracted. Now, if it can be shown that the support of the perineum, which, in other words, means pressure applied to the perineum, and to the posterior part of the vagina, does, by exciting reflex action, increase the energy of the pains, it would at once be granted, that such a practice, must necessarily increase, instead of diminish, the danger of laceration, unless the mechanical pressure is on the perineum in some other way, so as to more than compensate for the increased action of the expelling power.

"Denman, one of the most candid of all writers on midwifery,

seems to have had a vague suspicion of the insufficiency of the common plan, though, like most other authorities, he laid great stress upon the necessity of pursuing it. Speaking of parturition in the lower animals, he says: ‘Though no means are used to prevent the laceration of the perineum in quadrupeds at the time of parturition, it is remarkable that they are rarely or never liable to it, except in those cases in which the necessity of their situation is supposed to require assistance. It is, therefore, reasonable to suppose, that the frequent occurrence of this laceration in the human species, allowing that it is in some cases and in some degree unavoidable, ought to be imputed to some accidental cause, or to error in conduct, rather than to any peculiarity in the construction of the part or in the circumstance of their parturition, because, when women are delivered without assistance, I have not, in any case, observed any very considerable laceration.’ In another part of his work, he repeats, that ‘none of the classes of animals are ever liable to a laceration of the perineum, except when extraordinary assistance is given in cases of otherwise insuperable difficulty; and it is well known, that the laceration in any important degree does not universally, or perhaps, generally, happen to those women who are delivered before proper assistance can be given.’ On another occasion he admits that one of the most desperate cases of laceration which ever occurred in his practice, was in a lady with whom he had been most assiduous (on the ordinary principle of supporting the perineum) in his endeavors to prevent it.”

“Dr. Collins considers that frequent examination in slow labors excite inflammation, and that they are ‘a very frequent cause of laceration of the perineum, as in proportion to the amount of inflammation in this part, the more reluctantly will it be found to yield to the passage of the head, and more likely is laceration to be the consequence.’ Dr. Fleetwood Churchill is still more decided: ‘I really believe that it would be better not to touch the perineum at all, than to make injudicious pressure. It has been my lot to witness more than one case, where rupture was owing to excessive and injudicious support.’”

“In continental practice laceration is very common, and continental accoucheurs not only support the perineum but apply various unctuous substances, and dilate the vagina by introducing the

fingers, and then opening them so as to stretch the parts in the intervals of the pains. Thus it is evident that laceration may occur when the greatest attention is paid to the management of the perineum on the recognized plan; and that some authorities consider this great anxiety about it, together with the mutual interference it gives rise to, as one cause of laceration. Those, however, who have held this opinion, have thought chiefly of the inflammatory state of the parts which digitation produces. Little or nothing has been said about the increased motor action which such irritation excites."

"Now, to the question: Does irritation of the perineum excite reflex actions of the uterus and the respiratory muscles? All the egestive canals are under the control of the spinal marrow, and there is certainly no other instance in which irritation of any part of the canal does not excite the expulsive act. The excitor power, too, is generally most abundant about the external orifice. We see this in the sneezing produced by irritation of the nostrils, the vomiting from tickling the fauces, the cough from the irritation of the larynx, and in many other cases. In the same way that the os uteri is the most powerful excitor to uterine action, so I believe the os externum to be the part of the vagina the most strongly excitor of the respiratory muscles.* At other parts of the labor the child often remains stationary; but when once the pressure of the head is brought to bear on the edge of the perineum, it is speedily followed by the most forcible pains which occur in the whole course of labor, and which do not cease until the patient is either delivered or exhausted. I have frequently observed that the moderate pressure recommended as a guard to the perineum, in which this strongly excitor surface is irritated on the one side by the advancing head, and on the other by the hand of the accoucheur, exerts a sensible influence upon the pains, increasing both their frequency and force; and I have obtained the same admission from many experienced accoucheurs. I know many gentlemen largely engaged in midwifery practice, who, without attempting to account for it on principles similar to those I have advanced, are so convinced from experience of the mischief of supporting the perineum that they entirely avoid it. This view of perineal irritation was one

* Os externum here is intended to mean the orifice of the vagina.

of the first things which occurred to me, when I began to investigate the function of parturition and its diseases by the aid of reflex physiology."

"The consequences of the accident, when it occurs to such an extent as to preclude the adhesion of the fissure by surgical means, are truly deplorable. The subjects of it are entirely unfitted for the conjugal state, and, in many cases, there is no power of retaining the faeces. I have seen instances where the unfortunate sufferers were compelled to sit throughout the day on a bed-chair, and to sleep at night on a prepared mattress, because of the injury to the sphincter ani. Happily, at the present time, autoplastic surgery promises to do much for the relief of such miserable suffering. Still, extensive laceration must always be a very serious matter."

"The prevention of this accident is always an object of solicitude to the accoucheur, even in the most perfectly natural labors. The chief rule laid down by the great majority of obstetric writers, is the support of the perineum by the hand during the passage of the head and trunk: This we are directed to do with the most unremitting perseverance when there is an apprehension of rupture. The late Dr. Hamilton stated that he had supported the perineum for nine hours together, without intermission! This mode of prevention is generally considered as almost infallible; and when laceration of the perineum takes place in spite of it, the young practitioner generally blames himself for not having been sufficiently assiduous in its protection. Pressure on the part liable to the accident—simple mechanical pressure—is the chief thing recommended when the labor is acute, or the perineum is unyielding; soothing fomentations, the evacuation of the rectum, the application of soothing ointments, etc., being applied as accessories. Now, I confess I do not know a more absurd situation than that of an accoucheur, doomed to squeeze the sphincter ani for hours together. Not that I would, for one moment, ridicule any practice which could be useful, for utility is above all in the practice of our art, but I believe this plan to be well nigh as useless as it is absurd; in fact, it seems a true reliquum of the midwife, and it would be no small boon to obstetrics to relieve it from such a barbarism altogether."

"Even if there were no such principle as reflex motor action,

and no danger whatever of exciting inflammation, it may be fairly questioned whether the long-continued pressure of the hand, acting in a merely mechanical manner, is so adequate to support the perineum as is generally supposed. Pressure on the mouth of a distended tube, through which a large, solid body is passing, can have little effect in preventing laceration, unless it does this by preventing the advance of the distending body. It is not a little singular, that pressure exerted on the os uteri, by the head of the child within and the rim of the pelvis without, should be considered a common cause of rupture of the uterus, while the pressure of the perineum, between the hand of the attendant, and the head of the child, should be deemed a means of preserving this part from laceration ! There is no such great difference between the structure of the two parts, and the circumstances in which they are placed, as to warrant the opposite conclusion, so generally arrived at."

"The knowledge of the principle of reflex motor action would teach us that, in acute labors, in which lacerations chiefly occurs, where the pains are excited in sufficient or excessive force by the foetus, all external sources of motor action should be avoided. On the other hand, in cases where there is no danger of accident, when the pains are weak or deficient, external means of exciting parturient action may be resorted to beneficially. It follows, from all I have said, that if there be any truth whatever in the existence of excited motor actions in labor, from irritation of the parturient canal, pressure on the perineum and posterior part of the vagina is resorted to in those cases where there is a possibility of its being mischievous, and avoided when it might prove serviceable."

"Still, there is one way in which I believe the support of the perineum by the hand may be of service, and which indicates distinctly the proper mode of managing cases in which the danger of laceration exists. This is by mechanically retarding the advance of the head. If, by exerting pressure, we excite uterine action, and, at the same time, prevent its effects by retarding the head, we do wrong and right at the same time, and the right may more than counter-balance the wrong; but if we practice the right alone, the gain will be far greater. This we may do simply by moderate pressure on the head of the child. I apply this pressure by the

tips of the fingers and the thumb of the right hand, arranged so as to press in an annular form upon the presenting part. By acting thus, we do no injury to the child; we retard the advance, but we excite no unnecessary and unnatural motor action. The only circumstance in which I would recommend perineal pressure, are in those cases in which the perineum is largely developed in its posterior portion, and where the head of the child, instead of advancing under the pubic arch, is urged very forcibly against the posterior portion of the perineum, the anterior being little dilated. In some cases of this kind, support is advisable, the motor action excited of less consequence than the retardation of the head, which is advancing in an improper direction."

"But besides the immediate management of the perineum, much may be done in the way of precaution during the progress of labor. Where there is the apprehension of this accident, the indication throughout is to moderate the motor action, so as to give time for the gradual dilatation of the os externum. To fulfil this, the examination should be as seldom as may be consistent with proper attention to other points, such as ascertaining the presentation, and making those changes in the position of the presenting part which may be required. Great care should be taken to preserve the membranes entire until the os uteri is fully dilated; it is even beneficial if they should remain unbroken so as to act with fluid pressure on the perineum. Besides attention to these points, the rectum, the bladder, and the stomach, should be kept from irritation, lest these organs should become exciters of unnecessary parturient action. Volition and emotion require to be cautiously regulated; as both voluntary and emotional efforts frequently produce laceration. The best mode of preventing this is to encourage the patient to cry out, the open state of the glottis taking off the pressure, and rendering voluntary and emotional efforts alike impossible. Emotional motor action may often be thus neutralized by exciting a voluntary cry; but sometimes emotion is so powerful as to defy this control; the woman in a state of desperation almost amounting to rage, makes the most tremendous efforts at expulsion; in such cases, Denman states that he has obtained a respite by suddenly telling her that the child was actually born!" "*"Thou shalt not lie."*"

Believing, with Dr. Smith, that the expedient so strenuously recommended by authors generally, for avoiding a laceration of the perineum, is very often productive of the accident; it has been our habit, for several years, to entirely disregard such teaching, and to consign the patient to the bountiful protection afforded by the physiological law of dilatation, that protects the genital canal, through which the foetus passes, from injury, consequent upon the extreme distension to which the parts are subject during parturition. During the last ten years we have, in our public lectures, combatted this, what we are persuaded is an ancient error. The result of our own experience, and that of our numerous pupils, confirm us more and more in the conviction that the plan of supporting the perineum, by making pressure against it with the hand, during the passage of the child's head, as recommended, is an error of no trifling magnitude, which should be abandoned by every well-educated accoucheur.

But to return to our subject. After the child has been separated from the mother by dividing the cord, the accoucheur is to place one hand upon the abdomen, to ascertain if the uterus has contracted; if so, he will feel a hard globular body, between the umbilicus and pubis, about the size of a child's head. If the woman be fleshy, it will require considerable pressure to detect it through the thick abdominal walls; if thin, it can be more easily distinguished; but in either instance, the inexperienced practitioner may encounter some perplexity, in arriving at a satisfactory result, from the loose and flabby condition of the abdomen in a large majority of cases, the uterus contracts immediately after the expulsion of the child, and can be distinguished, if the search for it be properly conducted. Sometimes it will require a grasping movement of the hand, or the finger ends can be pushed with considerable firmness into the flaccid structures, until the substance sought after is discovered. If, after due effort, no such structure can be perceived, smart friction upon the abdomen should be made, and the flabby abdominal mass be grasped in the hand, several times successively, or a kneading movement instituted, this is for the purpose of facilitating the contraction, in case it has not taken place spontaneously. When the uterus begins to contract the hard body and fundus of the organ will be perceived under the hand,

when the fundus is found to be on a level with the umbilicus, and no unusual hemorrhage present. It will not be necessary to continue the efforts any longer, as there will have been a sufficient amount of contraction secured for the present.

SECTION III.—REMOVING THE PLACENTA.

Most authors direct that the woman should be allowed to lay, a longer or shorter time, from one to two hours, and wait for the spontaneous expulsion of the placenta. Our own experience abundantly satisfies us that this is another error of the past centuries, that should have been abrogated long ago. It is well known that the placenta is very often separated from the uterus, at the last expulsive effort that terminated the birth, and is left lying loose in the cavity of the uterus, or vagina; in either case, its continuance there any length of time can be of no possible benefit to the patient; but, on the contrary, while it remains undelivered, her mind is not entirely at ease, for most women have heard frightful stories of adherent placentæ, and the sufferings and dangers attending their extraction, etc., and they are much more ready to imagine that such may be their case, than otherwise, so long as it remains undelivered. If it should be in the vagina, the further contractions of the uterus can have but little effect in expelling it. If it remain in the uterus after the expulsion of the child, the first after-pain will most likely remove it to the vagina, where it may remain many hours, unless removed. We once knew a young practitioner, who, true to his instructions, waited patiently six mortal hours, for the escape of the placenta, during which time the woman had regular after-pains. Finally he mustered courage enough to attempt to remove it; his fears were worked up to the highest pitch, for he expected to find a case of morbid adhesion, and anticipated a serious difficulty in separating it—when lo! to his great surprise and delight, he found the placenta occupying the vagina just within the orifice, from whence he removed it, which he should have done within five minutes after the birth of the child, and saved himself and patient six long hours of painful anxiety, and gloomy foreboding. If, upon examination, it should be found, even, that the placenta had not been detached, this would be no reason for it to remain undelivered; on the contrary, the greater

would be the necessity for its removal at once. The reasons that we have already given for this action, would not only obtain here, but additional and more urgent ones would exist. The presence of the undetached placenta in the uterus would prevent its complete contraction, or rather it would be evidence that due contraction was not in progress, or its separation would be affected; in either case, the uncontracted state of the uterus, would cause imminent danger of hemorrhage, which it is always most desirable to avoid if possible. The longer the placenta remains wholly or partially attached, the greater the danger, for during the reaction that follows the exhaustion of delivery, if not before, flooding would be almost certain to ensue; hence the necessity of removing the placenta, and securing the contraction of the uterus as early as possible after the separation of the child, by dividing the cord.

The only reason, having the least plausibility, that is or can be urged in favor of the usual delay, is that the comfort of the patient may be enhanced, by being allowed to rest awhile, after the fatigues of labor, before being further worried, by interfering with the placenta, and in the mean time give it a chance of being expelled by the contractions of the uterus. It has been found almost universally the case, that this physical comfort, that is so carefully guarded, is most effectually neutralized by the mental discomfort arising from the uncertainty as to her entire safety, so long as the placenta remains undelivered. After this is effected, and the uterus contracted down within the pelvis, she can be assured of her safety, and enjoy her repose, undisturbed by any apprehensions of danger.

We were led to adopt this course many years ago, from the fact that during the time allowed for rest, and the spontaneous expulsion of the placenta, we were frequently alarmed, by violent attacks of hemorrhage in our patients, which could only be effectually and speedily arrested by the immediate removal of the placenta, and contraction of the uterus, and since we have pursued this plan, we have never met with a case, where the discharges, after delivery, amounted to more than a free lochial flow, at most.

To remove the placenta, the cord is taken in the left hand, and coiled two or three times around the index finger, or what is better, grasped with a cloth; resource must be had to one of these expe-

dients, to overcome its lubricity, without which a firm hold cannot be maintained; being thus secured, a sufficient traction to tighten it must be made upon it; it must then be loosely grasped by the right hand, with the index finger extended, and followed up until the extended finger comes in contact with the placenta, which will be seized by two or more fingers and removed, traction by the cord at the same time being made, to act in harmony with the movements of the right hand. If it be not found in the vagina, the right hand will continue to follow the cord into the uterus, and be guided by it to the placenta, which may be found lying loose in the cavity, or partially or entirely attached at some point of its surface; if found detached, it must be removed in the same manner as though it were in the vagina; if attached, it must be separated by making stronger traction upon the cord, perpendicular to the surface of the placenta. This is done by passing the index and middle fingers up to within an inch or two of its insertion, when it is to be raised up upon their ends, so as to be perpendicular to its base; at the same time the traction, by the hand holding the external end, is to be increased. By this manoeuvre, the separation is effected by much less force, than when it is applied in direction with the placental surface. The attachment, though entirely normal, sometimes is so strong, that this expedient becomes necessary, even after waiting many hours, for a spontaneous separation. After its separation, it must be drawn down so as to be grasped by the right hand, and removed. Directions for its removal, in case of morbid adhesion, will be given when we come to consider retained placenta.

In manipulating with the cord, care is necessary that too much force be not exerted upon it; for, in case of its rupture, we lose the advantage of it, as a guide to the placenta. Sometimes it is very strong, and will bear any amount of traction required, while at other times, it gives way very easily. By increasing the force upon it gradually, the least rent that may occur, will be readily perceived by the hand holding it, which intimates that it can bear no more with safety, and that a degree of relaxation is necessary. Any amount of force may be applied to the cord, in removing the placenta, that is compatible with its continuity, and not inconsistent with the normal condition of the uterus.

After the placenta is removed, whether spontaneously, or in the

manner above described, it will be deposited in a vessel, which will be furnished by the nurse, into whose possession it will be given. The accoucheur's next duty is to apply a folded napkin or cloth to the vulva, to receive what discharges may escape; it should be changed frequently, and continued in use during the continuance of the lochia.

SECTION IV.—THE BANDAGE.

After the delivery of the placenta, and the contraction of the uterus, down within the upper pelvis at least, the accoucheur proceeds to apply the bandage. This usually consists of a long towel, or strip of cotton cloth, of sufficient length to extend around her body, and overlap so as to allow it to be firmly fastened, by at least four large strong pins; and wide enough to include the whole length of the abdomen, from the scrofuliculus cordis to the pubis.

An appliance constructed for the purpose, is very much preferable to the one just mentioned. That which we prefer consists of a strip of some suitable fabric, of sufficient length and breadth, with gores set in, to fit over the hips, and with straps to pass around each thigh and fasten by two buttons on each side, about four or five inches apart at the lower part of the bandage, where it passes over the hips. These straps always keep the bandage in its place, by preventing its riding up, which is the great fault with the long straight appliance. It is designed to afford a general support to the abdominal viscera, and maintain them in their proper position, without which, from the relaxed state of their natural support, they are liable to displacement, occasioning much discomfort and pain. Women regard it of much value, as contributing largely, towards reducing the distended abdomen to its natural size, and thereby preventing it from attaining an unsightly and forbidding shape. The straight bandage may be kept in its place, by pinning the napkin to it in front and behind.

In order to get the full benefit the bandage is designed to afford, it should be applied with sufficient tightness to render the patient perfectly comfortable under its operation. The nurse should therefore, be directed to examine it at least once a day, and tighten it if necessary, lest it become too much relaxed, as the part it is designed to guard, diminishes in size, and the object of its appli-

cation be defeated. Some intelligent nurses are in the habit of making a compress, by folding a towel several times, and placing it over the abdomen, and pinning the bandage over it; this is designed to fill up the depression between the iliae, so that a more gradual pressure may be preserved upon the part it is intended to protect. This arrangement is well adapted to the patient, and when properly applied, it is of decided advantage; contributing to her comfort, and to a more effectual support of the abdomen.

The application of the bandage, properly belongs to the duties of accoucheur, but the nurse sometimes undertakes the adjustment of it. When this is the case, the accoucheur should oversee the work, as he will be held responsible for the result of misapplication or carelessness in its arrangement.

It should be worn from four to eight weeks, as may be required by the condition of the woman, if she shall have recovered her usual health and strength, and the abdomen be reduced to its usual size, she may dispense with its further use, especially if the weather be uncomfortably warm. On the contrary, if she remain weak and delicate, and the abdomen unduly prominent, it should be worn longer.*

After placing some dry, warm clothes about the woman's person, to protect her from the wet and soiled clothes in which she was delivered—she may remain undisturbed until she feels able to be put to bed.

Some authors direct that the woman should remain quiet a certain length of time, before being put to bed, but she can judge of this better by her own feelings. It should be done as soon as she feels able.

SECTION V.—DUTIES TOWARDS THE CHILD.

As soon as the child is born, if its cries be loud and strong, after a few moments' delay, for the pulsations of the funis to become somewhat diminished in force, which may be assisted by compressing it between the thumb and finger, so as to arrest the placento-infantile circulation, at the same time watching the effect

* Some very respectable practitioners, at the present time, are dispensing with the bandage entirely, and discountenancing its use by others—this we regard as one of the new fangled quirk of professional fashion, about as void of sense as the Grecian bend, and equally uncomfortable.

upon the child. If it be found innocuous, by the non-occurrence of any change in its appearance or manner, the accoucheur should proceed at once to apply the ligature and divide the cord. But, if the child should not cry, and respiration be not immediately established, but the cord be pulsating briskly, a little cold water dashed in its face, and upon its chest, will, usually, be all that is required to cause it to catch its breath, after which respiration proceeds regularly. Sometimes, delayed respiration is due to an accumulation of mucus in the trachea and air passages. This we have seen relieved by seizing the child by the feet, and suspending it a moment or two with the head downwards, at the same time giving it one or two short, sudden jerks, which seldom fails to dislodge the mucus which is to be removed from fauces and mouth by passing the little finger, wrapped with a fine rag, into the mouth and throat, and wiping it out.

If animation appears to be suspended, the limbs relaxed and motionless, the skin colorless, and the funis nearly or quite pulseless, the case is desperate, but not necessarily hopeless. The child should be placed immediately in a basin of warm water, so as to preserve a uniform temperature in the body of about 98°. The lungs should be inflated, some slightly pungent odor should be applied to the nostrils for an instant at a time, occasionally, and every effort made to effect resuscitation. Sometimes almost unexpected success rewards our perseverance. When the funis is pulseless, cold and shrunken, body pale, and limbs motionless, the child is, indubitably, *dead*. The cord should never be divided until respiration be fully established, or the child lifeless.

Sometimes, strangulation is produced mechanically, by the cord being coiled two or three times around its neck. When this is the case, it should be loosened and disengaged as soon as possible. It becomes necessary sometimes to divide the cord, to relieve the neck, before the ligature can be applied. Under such circumstances, it must be ligated afterwards, with as little delay as practicable; and to prevent hemorrhage from the foetal extremity, it must be firmly held between the thumb and finger until the ligature is tied.

It is the custom of some accoucheurs to ligate the cord in two places, about an inch apart, and divide it between them, leaving

one on the placental extremity, and the other on the extremity attached to the infant. The second ligature is altogether unnecessary, not only so, but positively disadvantageous. The ligature on the placental extremity prevents the discharge of the blood from the placenta, which discharge diminishes the size of the organ, in proportion to the quantity of blood that escapes. This diminution accelerates its separation from the uterus, when it is left attached after the birth of the child, and also facilitates its expulsion, or removal. In so far, the prevention of the escape of the blood, by the employment of the second ligature, is a disadvantage. There are but two reasons that can be urged in favor of the practice, and these are by no means invincible. The one considered the most cogent, is, that in case of twins, the second child might perish in utero, from the hemorrhage thus induced. A greater amount of hemorrhage usually follows the birth of the first child, from a partial or entire separation of the placenta, than is induced through the cord, by leaving the end untied; and yet the second one does not perish, if born within a reasonable time. And, moreover, there is no difficulty in ascertaining whether a second foetus remains in the uterus or not, by laying the hand upon the abdomen; if a second one be present, the abdominal tumor will be but slightly diminished, and the large, hard, uncontracted body of the uterus will be found occupying a far greater portion of the abdomen than when it is empty. When twins are suspected, it is proper always to make an abdominal examination; and if evidences of a second foetus be present, as a matter of greater security, the second ligature may be applied; but otherwise, it is always the better practice to omit it. The other reason that is urged in favor of the use of the second ligature is, that by restraining the hemorrhage that must unavoidably occur from the cord in the absence of it, cleanliness is promoted. The comparatively trifling amount of blood that could pass through the cord, can be of but small account, in regard to the matter of cleanliness, in view of the vastly greater discharge consequent upon the destruction of the placento-uterine attachment, and the expulsion of the placenta. It must be conceded that the stronger reasons preponderate against the use of the second ligature, when placed in the scale against the weaker ones urged in its favor.

One ligature, then, being sufficient for the attainment of the only object that can be had in view, viz.: the prevention of hemorrhage from the child, it is applied as follows: Having provided the proper material for a ligature, which should consist of a twisted cord, not so fine as to cut, through the structures of the funis, nor so coarse as to be bungling, or what makes a very good one, a piece of flat bobbin, about five or six inches in length; this is passed twice round the cord, about an inch and a half from the abdomen, and tied sufficiently tight, with a surgeon's knot, to effectually compress the vessels; it is then divided about half an inch above the ligature, the untied end being carried, under the clothes, to empty itself with the other discharges, and the child placed in a shawl or wrapper of some description, and given in charge of the nurse.*

SECTION VI.—WASHING AND DRESSING THE CHILD.

No time should be lost by the nurse, after she has received the child into her charge, before proceeding to the performance of this her first duty towards it. It is often covered, to a greater or less extent, with a fatty caseous substance, which adheres with great tenacity to the skin, rendering a separation extremely difficult, where a solution of soap in water, and a cloth or sponge, alone are employed for the purpose. By permitting the child to remain after its birth, any length of time unwashed, this substance becomes dry, increasing greatly the difficulty of removing it, thereby causing additional exertion on the part of the nurse, and consequently proportionate inconvenience and fatigue to the child; hence, the necessity of immediate action.

After having provided herself with a low stool or chair, and selected a place to sit, where she may be protected from any current of air, and, having prepared and placed close by her the clothes first to be put on the child, she must proceed to the discharge of this important duty by first rubbing the skin all over with some soft lard, sufficiently well to incorporate it with, and dissolve and

* It is recommended by some accouchers in these latter days to dispense with the ligature altogether, as very little or no hemorrhage follows the division of the unligated cord. We have seen alarming and even fatal hemorrhage follow the spontaneous separation of the cord from the abdomen, and wou'd be very loth to invite it by neglecting to apply the ligature.

loosen the caseous coat, just alluded to, and then the suds of fine Castile soap, of rather higher temperature than the hand, applied with a fine sponge or piece of flannel, will remove it without excessive rubbing, which would be required were the lard not employed. Care should be taken that the head, arm-pits, groins and folds of the skin of the neck, elbows, etc., where it abounds most plentifully, be entirely cleansed, because extensive excoriations are apt to follow a neglect of those parts. But more especially should the eyes be thoroughly washed; and this precaution should claim the attention of the accoucheur in particular, as the most disastrous consequences often follow a want of attention to these important organs. We once had the misfortune to witness a case of virulent ophthalmia, that resisted the most active and decisive treatment, and which terminated in the destruction of both eyes, leaving the poor child to grow up in total blindness, to arise from a neglect, on the part of the nurse, to have the eyes thoroughly cleansed. They should be washed in clean water, especially provided for the purpose.

After the washing is complete, the child is to be wiped quite dry and immediately dressed.

Some nurses and mothers, under the pretext of hardening the child, submit its tender and uninured organization to the chilling influence of a cold bath at first, and to a cold-water washing afterwards. This is a most barbarous and cruel practice, that could have had its origin only in savage tribes, whose athletic young are cited as evidence of its utility. Perhaps it has not occurred to these misdirected daughters of Hygeia, that the apparent universal healthfulness and vigor of young savages, their prototypes, are due to the fact, that all the delicate and more feeble infants perish in the process of hardening, while the stouter ones survive it.

It is the practice of some nurses to make use of *spirits* in washing the child, either mixed with the water, or rubbed over it after washing. Both of these practices are as much at variance with the laws of health, as they are with the comfort of the child. In regard to the latter, a writer in the *Medical Inquirer* thus remarks: "The application of brandy to the head and surface of the body, even in an adult, has been known to occasion the most serious inflammatory attacks, either of the brain, lungs or bowels; the evapo-

ration producing such a degree of cold as completely to check perspiration. In infants it is frequently followed by inflammation, either of the bowels, lungs, or membrane lining the nostrils, producing what nurses call snuffles."

The accoucheur—out of regard to the safety as well as the mere comfort of the child—should enter his protest against these absurd and unnatural customs, and require that the ablutions of his little charge should be confined to the free use of soft, warm water, and fine Castile soap, as the best means of promoting cleanliness, and most conducive to its health and well-being.

Dressing the Child. After the cleansing and drying process, the nurse should proceed at once to dress the infant, under the supervision of the accoucheur. The first matter to claim his attention is the dressing of the funis. This should be done by his own hands, or under his immediate direction; any neglect in performing this little service might result in very unpleasant consequences. The object of this dressing is to protect the skin surrounding the umbilicus, from the effects of the acrid and corroding moisture that attends the putrefaction of the portion of the cord that is left attached to the abdomen. Sometimes, for the want of proper attention, the skin becomes very much excoriated and inflamed, causing great uneasiness to the little patient, preventing sleep, and rendering it exceedingly restless and fretful, which interferes with the mother's convalescence, and gives the nurse a great deal of unnecessary trouble.

The proper dressing consists of a piece of fine linen or muslin, about four and a half inches long, which when doubled should be about three inches wide; in the centre of this should be made a hole just the size of the funis, through which it must be passed, and the rag placed longitudinally with the abdomen; the funis should then be laid upwards upon the linen, towards the chin, and the lower half of the rag laid up over it, and over this should be passed the binder or belly-band and be fastened behind. When the cord is very thick, and contains an excess of fluid, it is better to place two or three extra thicknesses of rag between it and the skin, to absorb the moisture from the cord as it escapes and prevent it from irritating the skin. In applying the binder, care should be taken that these dressings be not deranged, or thrown

into folds or wrinkles, as they make indentations in the skin, more or less painful, which are annoying to the infant, rendering it uneasy and fretful. The dressings should be kept as smooth and free from irregularities and unevenness as possible.

The dressing of the navel and the arrangement of the binder being completed, the diaper should be next applied; after which the nurse may proceed to finish attiring the baby as fancy or ability may dictate. Unfortunately hygiene is seldom consulted by many people, in regard to fashioning and arranging the apparel of young infants; fancy and custom seem to control these matters, and its life and health appear to be esteemed as a secondary consideration.

SECTION VII.—FEEDING THE CHILD.

When the mother can furnish a full supply of milk from the first, which is sometimes the case, no other provision need be sought after. But it more frequently occurs, that the breasts remain empty, until about the third day, during which time it is not expected the child must go without food. Immediately after the child is washed and dressed, it has always been our habit to have prepared a little warm water, sweetened with brown sugar, or good molasses, we prefer the latter, in proportion of one teaspoonful of molasses to three tablespoonfuls of water; of this two or three teaspoonfuls may be given from time to time. It satisfies the desire for food, and at the same time assists, from its aperient properties, in removing from the bowels the *meconium*, a substance familiar to every nurse, of a deep bottle-green color, that constitutes the first discharges. It is desirable to have this substance removed as early as possible, for where it is not thoroughly purged off, the child is apt to suffer with jaundice, colicky pains, acrid sour evacuations, etc., sometimes proving fatal. If this simple preparation prove insufficient, to produce an active operation, a teaspoonful of olive oil, or the oil of butter, may be given. We have known cases so obstinate, as to resist the effects of these even, and to require castor oil, of which a small teaspoonful, or three parts full of a large one, may be administered. At every attempt to give the child food or medicine, it should be allowed to suck it from the spoon, as it is less apt to strangulate it when taken in this way than when it is poured into its mouth.

The application of the child to the breast, as soon as the mother has sufficiently recovered from the fatigue of labor, should not be omitted, for by this means it will retain the faculty of sucking with which almost every child is born. This rule should be observed, even though the breasts appear to be empty, for the *colostrum*, the first secretions after accouchment, is Nature's physic for the child, and will assist the other means employed to remove the *meconium*. After two or three copious evacuations from the bowels have been obtained, and the color of the discharges become changed, a diet more nutritious and more imitative of its natural food, should be employed; for this purpose we have been accustomed to direct the following.

Fresh Cow's Milk,	1 tablespoonful.
Boiling Water,	3 tablespoonful.
Loaf Sugar,	sufficient to make it agreeable.

This may be given at once, and repeated as often as it may be required, until the mother can furnish a full supply, when it, and all other artificial preparations of food, must be dispensed with. The child should be put to the breast three or four times a day, from the first, although it appears to get nothing, for the reasons above stated. Many excellent practitioners now direct fresh undiluted cow's milk for the new-born infant.

SECTION VIII.—PUTTING THE WOMAN TO BED.

When the directions previously given, in regard to the part of the bed, upon which the woman is to be placed for delivery, has been complied with, it will be necessary, after the birth of her child, to have her placed in a more comfortable position, and on that part of the bed she is to permanently occupy. This is called "putting to bed." Although it does not strictly belong to the province of the accoucheur, to execute this part of the duties belonging to the lying-in-room, it is better, unless some urgent necessity require his absence, to remain until it is accomplished. For during the act of being removed, some grave accident might befall the patient, such as flooding, fainting, or some other unlooked for event, for which he might be held responsible; and moreover, his counsel and assistance might be needed, especially when the female attendants are few and inefficient. The length

of time the woman should lay, before being put to bed, must be determined by circumstances.

If there should be undue hemorrhage, or a tendency to it, or great exhaustion, or a disposition to faint upon being moved, etc., she should be allowed to remain undisturbed, until all the unfavorable symptoms shall have subsided, even though it may require several hours. If there be no unfavorable symptoms, and she shall have so far recovered, from the fatigues of her labor, as to feel able to bear the exertion, no further delay will be necessary, than the time required to give attention to the child. Generally after the duties due it, have been discharged, the mother feels desirous, and is able to be "put to bed." This service is commenced by removing from about her person all the wet and soiled clothes, napkins, etc., which may have been in use during the labor. It is very grateful to patients, at this point of the proceedings, to have the parts, and all such portions of the body, that have becomes smeared, or unclean, washed with warm water and Castile soap, and wiped thoroughly dry; there should be no draught of air, and the atmosphere of the room should be comfortably warm during this process. Should she, from the exertions of labor, the warmth of the weather, or room, be in a perspiration, she should not be disturbed, nor bathed until it has entirely passed off, and the clothes she designs wearing be quite dry, as at this time, an apparently trifling exposure to cold, might result in very serious consequences. The consent of the accoucheur, if asked, need not be withheld in regard to bathing, provided all the conditions are favorable, for cleanliness is a boon very highly prized by many ladies, and if withheld at this time, it would be a source of very great annoyance and discomfort. After being thus prepared, she must be carefully lifted or slid into the place she is to permanently occupy—care should be taken that the hips are placed fully upon the folded sheet next the bed, prepared to protect it against the subsequent discharges. The bandage should be examined to see that it did not become deranged, during the moving. The clothes that have remained rolled up throughout the labor must be adjusted, and the patient covered with the bed clothes adapted to the season, and this completes the work of putting to bed.

SECTION IX.—AFTER-PAINS.

If it be the first accouchment there will probably be no after-

pains to disturb the rest of the patient. If, however, it be a subsequent one, they will need attention. It is the opinion of many nurses, that after-pains are a natural result, and console the sufferer with the impression that they are unavoidable and must be endured. This is an erroneous view of the ease, and should be corrected. It is true that they are the natural result of her condition, but that is required to be changed, so that all uncomfortable results may be avoided. The nervous system must be acted upon, so as to cut off for a time the sympathetic relation between the brain and uterus, or, in other words, blunt the nervous sensibility, to which the after-pains are due. For this purpose we have for many years employed the following prescription, which will be found, in most instances, to have the effect of controlling the pains so far as to render them endurable, at least, if not to arrest them altogether, and that, too, without materially interfering with the contractions of the uterus :

R Morph. sulph.,	grs. ii.
Tinct. belladonna,	gtt. xxx.
Aqua camphora,	$\frac{3}{4}$ ij.
	M.

¶. Take a teaspoonful, every one or two hours, until relieved.

When the morphia, or any of the preparations of opium, disagree with the patient, the following will be found perhaps equally efficacious :

R Ext. hyoscyam.	$\frac{3}{4}$ ss.
Ext. belladonna,	grs. i.
Camphor,	grs. viii.

Div. Pill, xvi.	M.
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¶. Take one every two hours.

As the pain begins to subside the intervals may be lengthened accordingly.

The labor and its sequent duties having terminated, the accoucheur is at liberty to withdraw, after leaving such directions as are necessary for the guidance of the nurse until his return. He should repeat his visits daily or tri-weekly, as the necessities of the case may require, until the patient be so far recovered as to be out of danger.

CHAPTER IX.

MANAGEMENT OF THE LYING-IN WOMAN AND HER CHILD.

BESIDES the treatment of the after-pains, there are some other natural results of parturition, that partake so much of the pathological condition as to require the attention of the accoucheur for some days after delivery. They are the *lochia* and the *secretion of milk*, the milk or ephemeral fever or weid, together with the general regimen during the month, as well as some further necessary duties towards the child.

Lochia, from *λοχος*, lochos, "a woman in child-bed." *The cleanings*, a discharge that follows parturition, and continues generally from fourteen to twenty-one days. For the first two or three days it is purely sanguineous, and proceeds from the space left bare by the separation of the placenta. It escapes from the vessels which supplied the blood for the utero-placental circulation, during the attachment of the placenta to the uterus; but after its removal, the blood is discharged into the cavity of the imperfectly contracted uterus, whence it flows through the vagina and external organs. For the first day or two it forms clots in the uterus, which often cause an increase in the severity of the after-pains, and is only relieved by their expulsion.

As the vessels become diminished in their calibre by the tonic contractions of the uterus, the discharge proportionably diminishes in quantity and in depth of color, until it assumes the appearance of a serous secretion, and is eliminated in less and less quantities as the uterus becomes more perfectly contracted, until the flow entirely ceases.

From this explanation of the cause and character of the lochia, it must be evident, that the quantity, color, and duration of the discharge must depend wholly upon the condition of the uterus; and that these characteristics of the flux in one woman, can be no rule or guide for them in another, nor in the same one after different labors, as the tonic contractions of the uterus may vary in their

character in different women, and in the same woman at different times.

It may be very free, and the blood, either coagulated or not, or mixed, may continue to escape for several days after delivery, and the pale discharge, in increased quantity, may continue much longer than the average time of its duration, and no other evil consequences follow than more or less debility from the excessive discharge. In such cases, the tonic contractions of the uterus, and the reduction of the vessels, are but imperfectly performed. On the other hand, the discharge may be scanty from the first, the color change within twenty-four hours, and the flow cease, within five or six days, entirely. This, instead of being indicative of an unfavorable state of the system, and ominous of evil, as it is very often regarded, shows that the contractions are being more perfectly performed, and the uterine vessels so far reduced in size, as not to admit of a more copious elimination of their contents. Nurses, generally, are suspicious of these scanty lochial discharges, and imagine they forbode mischief. This apprehension no doubt arises from a fact that they may have often observed, which is, that a suppression of the lochia is frequently attended by unpleasant and often unfavorable symptoms, such as fever, distress of the head, inflammation, etc. These complications only exist where the suppression is symptomatic of some morbid change that has taken place in the system, as the result of cold, or some other irregularity. We desire that such may not be confounded with those normal manifestations that evince a healthy state of the system, and a perfect contraction of the uterus.

When the suppression occurs as symptomatic of some other disease, which acts sympathetically upon the uterus, causing a premature contraction of its vessels, that disorder must be made the subject of attention, though the nurse and friends will insist that something must be done to restore the discharge. The intelligent accoucheur will not allow himself to be diverted from the true cause of the difficulty, and be made to trifle with the mere effect. A return of the lochial discharges, under such circumstances, will afford the best evidence that the cause of the suppression has been reached, and is being effectually removed.

SECTION I.—EXCESSIVE LOCHIA.

This is also sometimes caused by an impaired state of the general health, which interferes with the perfect contractions of the uterus, and, consequently, a diminution of its vessels, and is often as difficult to control as the foregoing. It is commonly found to be associated with a febrile state of the system, which is marked by periodical exacerbations and intermissions, the former generally towards evening, which is usually preceded by a sensation of chilliness, but which may be so trifling as scarcely to be noticed by the patient.

The treatment here indicated, is that generally employed in intermittent fever, with such modifications as the peculiarities of the case may require. If the bowels are constipated, further treatment should be premised by an appropriate cathartic, which should be sufficiently active to pretty thoroughly evacuate the *primæ vide*, without being drastic; this accomplished, the following prescription will be found serviceable in changing the intermittent phase of the disorder.

R Quinine sulph.	grs. xvi.
Acid sulph. aromat. f.	3 ss.
Syrup simp.	3 ij. M.

¶. Take a teaspoonful every two hours, during the absence of the exacerbation; and during the fever, which is most frequently present in the after part of the day, the following will be found an admirable febrifuge.

R Tinct. aconite, fol.	} M. xvi.
“ belladonna,	
Aqua fort.,	3 ij M.

¶. Take a teaspoonful every two hours.

This will almost invariably shorten the febrile exacerbation, while the preceding prescription will prolong the intermission, and in this way the disordered action will be overcome, and a condition of health established. Should the lochia continue in excess, from the general debility, that uniformly supervenes this low intermittent form of disease, the following will act specifically, in promoting the uterine contractions, and consequently in closing the vessels and arresting the discharges.

R Ol. erigeron	3 ss.
Fl. ext. secal. corn.	3 “
Symp. acac.	3 ij. M.

¶. Take a teaspoonful three or four times a day, gradually increasing the intervals, as the discharge diminishes.

By pursuing this or a similar course, all the difficulties will be found to yield in two or three days, and the patient to be decidedly convalescent; which state may be encouraged by the use of some of the mild vegetable tonics, and a generous, nutritious, but not stimulating diet.

SECTION II.—THE GREEN WATERS.

This is the name given by nurses, and women familiar with the circumstances of the lying-in room, to a peculiar, copious, watery discharge, of a greenish color, that immediately succeeds the red-colored emission. It has an extremely noisome, sickly odor, which is extremely loathsome to the patient, and disagreeable to the attendants and visitors. It most probably results from the decomposition of some portion of the placenta or membranes, that have been allowed to remain in the uterine cavity, after the main body of the secundines has been expelled or removed; or it may be due to an imperfect state of the general health. Constitutional debility often results from the excess of the evacuation, and a hectic state of the system is sometimes present during the discharge.

The tonic treatment just recommended for excessive lochia will be found equally beneficial in this variety. The mixture of erigeron and ergot must not be omitted. The parts should be well bathed, three or four times a day with warm water, acidulated with vinegar. If they have become excoriated, from the acridity of the discharges, which is not unfrequently the case, the clear water should be used. Vaginal injections of warm camomile tea, slightly impregnated with chlorated lime, or a weak solution of carbolic acid, should be freely used at the same time the bathing is performed. These operations promote cleanliness and destroy the foetor, which greatly enhance the comfort of the patient. This treatment, with a proper condition of the bowels, the free use of tonics, a generous diet, and liberal ventilation, if perseveringly pursued, will produce a very decided improvement in a few days.

SECTION III.—RETENTION OF URINE.

Sometimes, in severe and protracted labors, where the head is retained a long time in the inferior strait, from the contusion of the parts, they become so swollen as to close the urethra, and prevent

the escape of urine. As the obstruction is purely mechanical, the use of diuretics is contra-indicated, as they tend to augment the secretion without aiding its discharge, and hence increase the suffering. As an over-distended bladder, besides being very painful, may favor the development of cystitis, its evacuation is imperative, and to effect this, the catheter affords the most prompt and efficient means of relief.

The child sometimes fails to pass its urine for two or three days, or even longer. Dr. Dewees relates a case where the retention continued for ten days, and was then relieved by the use of a small flexible catheter, when eighteen ounces and a half of straw-colored urine were drawn off; the child died in three days after. Such inveterate cases of infantile retention, fortunately, do not often occur. Some of the milder diuretics, as watermelon-seed tea, a few drops of sweet spirits of nitre, a weak infusion of buchu leaves, etc., with warm hip baths, will generally be sufficient. But if these fail, the catheter must be employed as the ultimate resort, notwithstanding the difficulty of introducing it, especially in the male infant.

SECTION IV.—THE SECRETION OF MILK.

As has already been stated, while studying the signs of pregnancy, the breasts often undergo greater or less modifications very early in that condition. In some women this occurs in a very decided degree, while in others it is less remarkable. One of the principal changes is more or less tumefaction, which continues throughout the period of gestation.

As the close of this process approaches the tumefaction increases, and, not unfrequently, a thin, watery, wheyish fluid, of a yellowish color, oozes from the nipples, for some days or weeks before labor comes on. This is sometimes so abundant as to be inconvenient, requiring the use of nipple-shells.

SECTION V.—COLOSTRUM.

This, after the accouchement, is called the *colostrum*, from *χολον*, *kolon*, food, for it now becomes food for the child. In about twenty-four hours after delivery the colostrum changes its color, by becoming white, and having more the appearance of milk. But it is not

generally before about the third day that the breasts manifest the great change that is effected in their appearance and condition, by the full secretion of milk. At this time they become greatly enlarged, and are much harder than at any previous time. The enlarged subcutaneous veins, presenting their blue branches, are seen coursing their way beneath the skin in various directions. The lacteal tubes often become so distended as to be more or less painful, and are relieved by the spontaneous flow of the milk they contain. The process of lactation is favored by the gentle stimulus imparted to the organs, by the nursing of the child, when early applied, which should never fail to be done as soon as the mother is sufficiently recovered from the fatigues of the labor.

Sometimes the milk continues to increase from the first, and its presence is not announced by the sudden and decided changes that take place in the breasts, in a very large majority of cases; sometimes it is delayed until the fourth, fifth or sixth day.

SECTION VI.—THE MILK OR EPHEMERAL FEVER.

The secretion of milk is usually preceded or accompanied by a sense of chilliness, sometimes amounting to a decided rigor, which is followed by headache, flushed face, dryness of the mouth and throat, thirst, heat of skin, more or less pain in the back and limbs; the pulse at first small and hard, then full; in fact, by most of the symptoms characterizing an attack of fever. In the course of the day the breasts become swollen, hard, and often so painful as to interfere with the movements of the arms and chest. The lochia is generally affected, and often entirely arrested. This febrile condition continues a few hours, and is succeeded at first by moisture, then by a sweat more or less profuse, with a restoration of the lochia, and by an absence of the pain in the head. The attack generally passes through its cold, hot, and sweating stages, in the course of twenty-four hours, hence its name, ephemeral fever, or the fever of a day.

Sometimes, however, the fever is prolonged for two, three, or even four days; when this is the case, it is very suspicious that some deep-seated local irritation or inflammation exists, that is contributing to its continuance by its sympathetic action.

It has been observed that the milk fever is less severe in primi-

paræ than in other cases, and in those who put the child to the breast early after delivery; in fact, some of the latter often escape it entirely, or are but a little effected by it. In some women the breasts never secrete any milk; such, of course, are exempt from milk fever, while others, who have an abundance, and who never nurse their children until after it is secreted, escape it entirely. But these are anomalous cases that but rarely occur.

The milk fever is evidently sympathetic, and results from the irritation of the mammæ, incident upon the secretion of milk.

1. *Treatment.* It is very seldom that much treatment is necessary. It has always been our habit to anticipate the attack, on the morning of the third day after delivery, where the bowels have not been moved since that event, unless earlier indicated, with an active dose of castor oil or magnesia. The operation of this is generally followed by the application of the tincture of aconite and beladonna, in doses of two drops each, every two or three hours, until the fever subsides. Very often, however, no febrifuge is required, as the fever abates spontaneously in a few hours. If there should be a recurrence of the chill and fever, on the following or second day after the first accession, or the disease have the appearance of degenerating into intermittent fever, the sulphate of quinine should be administered in appropriate doses; this seldom fails in arresting that tendency, and improving the general condition of the patient.

After the abatement of the fever, the breasts continue swollen and painful, the fullness extending almost to the axillæ, which prevents the arms from lying by the sides, but compels the woman to lay with them extended at right angles with the body.

Should the milk flow freely from the nipples, which it sometimes does, immunity from suffering would be thus spontaneously afforded. But, where this is not the case, some means of relief must be resorted to, otherwise inflammation and suppuration may be the result.

Where the milk flows freely, it is recommended to fold a soft linen towel in several thicknesses and lay it in the bosom; or, what is regarded better, several layers of cotton wadding. This is designed to absorb the milk, and prevent it from wetting the patient's clothes; it is directed to be removed when it becomes

saturated and its place supplied with a dry one, and so continued so long as a necessity for it may exist. A much neater and better arrangement, and one to which we can see no objection, consists in the use of the nipple-shells, a little glass instrument designed to be placed upon the nipple, and to receive the milk as it flows from the breast; this can be emptied when full and reapplied, without in the least wetting or soiling the garments with which the breasts are clothed.

Warm emollient cataplasms are recommended to be applied to the breasts, with a view of softening them and reducing the swelling, where the milk does not escape spontaneously. We have so often witnessed failures from this mode of procedure, that we have but very little confidence in it. The first and most important indication is to relieve the breasts of their accumulation of milk. If the child is incompetent for this, recourse must be had to other means; much benefit has been derived from the use of a properly constructed breast pump. Sometimes the nurse, or some friend or relative, possesses the faculty of sucking, and can be made very efficient in drawing the breasts. A young pup has often been employed for this purpose, with great advantage. Where the nipples are absent or embedded in the mammae, and cannot be made available in removing the milk, means must be adopted to remove it by promoting absorption, and this can generally be accomplished by friction and the use of some effective liniment. We have found soap liniment and tinct. belladonna, in proportion of two ounces of the former and one ounce of the latter, very effectual; the liniment should be applied quite warm, and the breasts rubbed with it as hard as can be comfortably borne, for fifteen or twenty minutes each. This application should be made two or three times a day, and the breasts will soon begin to get soft and the pain quite relieved. After this is once effected, there is no more trouble to be apprehended, unless cold be taken, or some other irregularity causes a relapse.

SECTION VII.—REGIMEN.

Before the secretion of milk, and during the milk fever, the food of the patient should be of the blandest and most unirritating kind, such as tapioca, sago, or arrow-root gruel; flour, oat meal or

Indian gruel, well boiled; or bread or crackers boiled in water and sweetened with loaf sugar, panade, etc., into which must enter neither butter, nor any variety of stimulating liquor, nor any of the heating condiments, as nutmeg, cinnamon, etc. When the appetite is good, and the desire for food urgent, a bowl of either of the foregoing preparations, may be allowed every two or three hours. It is always safest to avoid everything of a stimulating character, either as food or drink, until after the ephemeral fever has passed, and the breasts have recovered from the irritation consequent upon the first gush of milk that fills all their tubes to the utmost degree of distention. An error in the regimen, at this stage of her recovery from the effects of the parturient efforts, might be attended with very disastrous consequences; notwithstanding some women may boast of their disregard of all dietetic restrictions, and freely indulge in whatever their appetite may crave, with perfect impunity. They may escape the consequences of such imprudence, but they incur great risks. After the critical period has passed, a slice of cream toast and a cup of sweetened milk and water, weak cocoa or chocolate, with the white of a poached egg, may be allowed for breakfast; the soft ends of half-dozen oysters, with a bowl of soup made of them, and three or four crackers, for dinner, and a bowl of gruel in the interim; her afternoon lunch and evening meal to consist of a bowl of panada, or rice gruel. After a day or two more her fare may be enriched by the addition of beef, chicken or lamb tea, or weak broth, with a small portion of the meat, and the usual table vegetables, for dinner, with toast and three or four roasted oysters or a boiled egg for breakfast, and mush and milk, or a slice of bread and butter and a cup of black tea for supper, and a bowl of broth, or mush and milk between meals, if required. After the tenth day, ("nothing forbidding,") she may be allowed a moderate indulgence in almost anything her petite may crave. If a proper course were pursued, in regard to her regimen, we are confident there would be fewer instances of bad getting up, as it is called, and much more comfort experienced by the patient, than falls to the lot of many women in their confinements, where an opposite one is observed.

There is an impression entertained by the generality of nurses, and favored by many others in the community, who are not pro-

fessedly care-takers of the sick, which is as erroneous as it is general, that the woman, after having passed through the painful and fatiguing process of parturition, labors under extreme debility, requiring the most nutritious and stimulating diet to enable her to overcome it ; that a great degree of debility exists after such an effort no one will deny, but time and proper means are required to effect a resuscitation, this cannot be done suddenly by the use of improper and violent resources.

The pernicious practice followed by some women, because recommended, by that busy old dame, Gossip, of drinking large draughts of tea, chocolate, beer, ale, etc., for the alleged purpose of promoting the flow of milk, cannot be too strongly condemned. If good health, good, wholesome, nutritious food, and a reasonable amount of exercise in the open air, will not insure an ample supply of milk, it is certain a resort to the excessive use of such slops will not be likely to supply the deficiency.

SECTION VIII.—THE THRUSH, OR CHILD'S SORE MOUTH.

There are a few little ailments to which the child is liable during the month, that may be brought to the attention of the young practitioner, and in reference to which his advice may be solicited.

The first one that is generally noticed, and always looked for, is the thrush, commonly called the "baby's sore mouth." It consists of small ulcers, surrounded by a red inflamed surface, and covered by a white curd-like deposit, called *Aphthæ*, from *ἀπτω*, apto, I inflamed. It is generally observed when the child is but a few days old, and is considered by nurses, and the generality of people, as inevitable ; and if it is escaped during infancy, it will necessarily manifest itself sometime during the life of the individual. Frequently the anus is affected in the same way, which gives rise to the erroneous impression that the disease passes through the child, and that the whole of the alimentary canal is similarly affected. But dissections show that the contrary of this impression is correct.

It is by no means an essential condition of infancy, but a sympathetic affection, arising from a derangement of the stomach. Sometimes, it does not occur at all ; at other times, it is so slight as scarcely to be perceived ; while again, it is very severe, and, occasionally, proves fatal. It usually attacks feeble and delicate

infants with greater vehemence than the strong and robust ones, and is more intractable.

It is the habit of some nurses to wash out the mouth of the child every morning with a little cold water, as a preventive; and we have observed, where this precaution has been used, that the disease has been much milder, and of less frequent occurrence. As a further prevention, all improper food, as pap, panada, etc., should be avoided, as they tend to fermentation immediately upon being received into the stomach, and acidity, the generation of gas, and flatulence, etc., are the result; from which condition of the stomach, the "thrush" is doubtlessly developed.

1. *Treatment.* In the milder cases, a little borax and loaf sugar, rubbed up together, and a pinch or two sprinkled in the mouth, two or three times a day, will generally be found sufficient. Where it is of a graver type, and complicated with debility, some of the milder vegetable tonics should be administered; if its food disagree with it, as will be shown by emaciation, disordered bowels, green, watery discharges, griping pains, etc., it must be discontinued at once, and something more congenial to its disordered condition resorted to. Proper medication should also be employed, as gentle alteratives, astringents, tonics, etc. The local treatment suggested for the milder cases should not be neglected. Some nurses resort to various astringent washes for the mouth. Washes, of any description, are objectionable, after the disorder has manifested its presence, because the washing is apt to abrade the very delicate pellicle that may be forming over the ulcer, which indicates the curative process has commenced, and which should not be interfered with. The course often pursued, of washing and rubbing the mouth, with the view of separating the aphthous deposit from the ulcers, is highly reprehensible, as it must necessarily disturb the healing process that may be commencing beneath the deposit, and thus prolong the disease. Any application designed for the mouth, should be used in fine powder, and sprinkled on the tongue, to be dissolved by, or mixed with the saliva, and carried to the ulcerated surfaces through that medium.

SECTION IX.—STROPHULUS LICHENIASIS, OR RED GUM.

This consists of a red papulous eruption, that comes out over

the surface of the body, generally within the first week after birth ; it is also considered one of the essential conditions of early infancy, by most nurses and mothers, and indicative of good health. How near it may be allied to the eruptive disease of the mouth, which we have just described, or whether it is the same, manifesting that difference in appearance only, that is dependent upon the difference of the structures involved, the one being the rete mucosum, and the other a mucous membrane, has not been determined. They appear at, or about the same time; are evidently derived from the same cause, the development of the latter, assisted, no doubt, by keeping the child too warm ; and they generally disappear, when uncomplicated with the other affections, nearly, if not quite together.

The latter seldom disappears without leaving a yellowish or jaundiced appearance of the skin, which is, by most authors, regarded as the result of some functional disarrangement of the liver, which interferes, more or less, with the normal disposition of the biliary secretions, causing them to be absorbed and carried into the circulation, thus communicating to the skin its yellow tinge. An imperfect or tardy removal of the meconium, no doubt, also contributes to this appearance of the skin. The white of the eyes, nor the urine either, participate in this change of color, except in more aggravated cases, when they become very perceptibly implicated.

Treatment. In the milder forms of the disorder, whether in its primary or secondary manifestation, very little or no treatment is required. If there should be a confined state of the bowels, this must be relieved by some mild laxative, and if diarrhoea be present, it should be restrained. If the icteric state of the skin, which may almost be considered a sequela of the red gum, be very decided, with the white of the eyes and urine strongly colored, and the child be fretful and sleepless, with more or less febrile symptoms, an emetic of ipecac., or the wine tincture of lobelia, should be administered, which, from its specific action, and the mechanical pressure the act of vomiting produces upon the biliary organs, causes a dislodgement of the accumulated bile, which is often followed by a marked improvement, and not unfrequently by a speedy recovery. If such effects fail to succeed the use of the emetic, it

may be repeated in a few hours, or followed by a mild cathartic, as magnesia and rhubarb, in doses of two grains of the former with one of the latter, rubbed up together, and administered every two or three hours, until a full bilious, evacuation be produced; after which, the little patient will soon show signs of improvement, in the absence of restlessness and the supervention of comfortable and undisturbed sleep; which will be followed in a day or two by a decided change in the color of the skin, for the better, and a more even and natural appetite. Drs. Eberle, Dewees, and their contemporaries, recommend small doses of calomel in those cases, say one-eighth of a grain every two hours, until the desired effect be produced. As the object is rather to disgorge the liver, than to excite it to increased action, the course we have indicated above, with proper bathing, exercise and airing, will be found the more successful treatment.

PART ELEVENTH.

DYSTOCIA, OR LABORS REQUIRING ASSISTANCE.

DYSTOCIA, from $\deltaυς$, (dys,) difficulty, suffering, trouble, etc. ; it is the synonym of the English adjunct *dis*, and $\tauοκος$, (tokos,) to bring forth, child-birth. It is a term, used to designate unfavorable labors, is of great antiquity, and was employed by Hippocrates, and since by some of the older writers, as Sauvages and Désormeaux. Of late it has become so generally adopted, that it is now regarded as a generic term, and is applied to all those labors, in which, if left wholly to the unassisted powers of the organism, the safety of the woman or child, or both, would be endangered. It is difficult to divine, how the use of a term so definite and expressive, and at the same time so comprehensive, should have been discontinued by obstetrical writers, and the arbitrary ones, as preternatural, laborious, mechanical, mixed, manual labors, etc., substituted in its stead. Dystocia comprises all that class of labors that are not entitled to the designation of spontaneous, whether the difficulty exists in the woman or foetus. Dystocia may be divided into two species, which may be distinguished by the character of the divergence from the normal conditions: 1. Those instances that depend upon accidental causes, occurring at the time of labor. 2. Those that depend upon pre-existing causes. Each species may be divided into two varieties, viz.: 1. Those pertaining to the woman, and 2, those pertaining to the foetus.

FIRST VARIETY OF FIRST SPECIES.—*Those instances that depend upon accidental causes, occurring at the time of labor, pertaining to the woman.* Amongst these may be enumerated, 1, hemorrhage; 2, convulsions; 3, hernia, with or without procidentia; 4, sudden attacks of acute diseases, as local inflammation of one or more of the vital organs, or some violent nervous affection, as gastralgia, neuralgia of the heart, brain, etc., asthma, syncope, exhaustion, inertia, or laceration of the uterus, etc., together with every other irregularity that can possibly occur to the woman at the

time of labor, that may jeopardize her safety or of the foetus, thus rendering assistance necessary.

SECOND VARIETY.—*Those accidental causes depending upon the fœtus.* As 1, a premature descent of the cord, and 2, some of the malpositions that are not present until after the commencement of labor, resulting from spontaneous evolutions, etc.

FIRST VARIETY OF SECOND SPECIES.—*Instances depending upon pre-existing causes, pertaining to the woman.* Deformities of the pelvis, malformation or disease of the generative organs, obliquity of the uterus, stone in the bladder, chronic diseases, as phthisis, dropsy, etc., aneurism, fibrous or other tumors in the pelvic excavation, deformities in respect to height, etc., together with any other possible condition, that may exist, in regard to the woman, previous to labor, which may interfere with its normal progress and consummation.

SECOND VARIETY.—*Instances depending upon pre-existing causes pertaining to the fœtus.* As 1, Transverse positions; 2, monstrosities; 3, diseases, as hydrocephalus, hydrothorax, etc.

Thus can be arranged, in a systematic order, all the various deviations from a perfectly normal labor, under one generic term, which admits of none of the confusion, and uncertainty of meaning, incident to the different vague and arbitrary names, that have, from time to time, been introduced as its substitutes.

CHAPTER I.

FIRST VARIETY OF THE FIRST SPECIES OF DYSTOCIA.

INSTANCES DEPENDING UPON ACCIDENTAL CAUSES OCCURRING AT THE TIME OF LABOR, PERTAINING TO THE WOMAN.

SECTION I.—HEMORRHAGE.

METRORRHAGIA, from *μητρα*, (metra,) “*the womb,*” and *ργνυμι*, (regymi,) “*I break forth,*” a flow or discharge of blood from the internal surface of the uterus. This may occur at a menstrual period, or in the absence of it, or it may occur at any period of pregnancy, and may be attributed to a variety of causes. Of the different varieties of hemorrhages taking place from the uterus, unconnected with parturition at term, or prematurely, after the seventh month, we have nothing to say, in this connection. While

discussing abortions, (page 405,) directions were given for the management of hemorrhages complicating those accidents. Uterine hemorrhages unconnected with pregnancy, do not come within the province of this work; the student is therefore referred to some of the treatises on the diseases of women, for an elucidation of that class of hemorrhages.

Hemorrhage occurring during parturition at term, or prematurely, is always to be regarded as a very grave accident; and the earlier it occurs in labor, the more are its consequences to be dreaded, because a longer time must necessarily elapse before the uterus can be emptied, and its contraction secured, which constitute the only certain means of arresting it successfully. Hemorrhage, during pregnancy, has been attributed to a variety of causes. These may be divided into *remote*, and *proximate or immediate*. As regards the *remote* causes, they are of almost infinite diversity, in fact, anything that may tend to augment the menstrual flux, or induce metrorrhagia at any other time, may produce it now; as various acute or chronic diseases, accompanied with plethora, or a hemorrhagic tendency, may favor the occurrence of the accident at this time. Some epidemics are particularly hemorrhagic in their character, and if the woman should chance to be the subject of one of these, at or towards the time of her accouchment, she could hardly expect to escape hemorrhage, as its consequence. Fatigue, loss of sleep, exciting regimen, stimulating drinks, drastic purgatives, warm baths, sudden and violent mental emotions, as excessive anger, grief, joy, surprise, etc.; any severe physical exertion, as riding over a rough road, horseback riding, straining to lift a heavy body, efforts at vomiting, coughing, straining at stool, the concussion from a fall occasioned by alighting upon the feet, knees, or ischia, or blows upon the abdomen or pelvis, or falling from a distance and alighting on either of these parts. In addition to these causes may be named ulceration of the os or cervix uteri, the presence of a polypus, fibrous, or other tumors, in the walls of the uterus, or anything calculated to produce congestion of the uterus, whether it be mental or physical, normal or abnormal, acts as a remote cause of hemorrhage; and pregnancy itself being the most prolific cause of all.

1. *Placenta prævia*, or placental presentation, where the placenta is attached at the inferior segment of the uterus, or over the os uteri. The attachment of the placenta, in this unfortunate location, is a certain cause of hemorrhage, and unavoidably so, hence the hemorrhage resulting from it has been termed "*unavoidable hemorrhage*." It does not often occur until towards the close of gestation, seldom before the sixth month, sometimes not until the seventh, and is very rarely delayed until the eighth; and manifests its greatest destructive power at the ninth, if pregnancy endure, and

the woman survive it until that time. It is imminently dangerous as regards the woman, and almost always fatal to the foetus. The reason why it does not appear at an earlier date of pregnancy, is because, up to the time mentioned, the growth of the uterus and placenta go along together *pari passu*; after that time, the uterus proceeds in its growth more rapidly than the placenta, which causes a separation between them to a greater or less extent, giving rise to hemorrhage just in proportion to the extent of the separation. It at first, perhaps between the sixth and seventh months, begins with slight attacks, and at longer or shorter intervals, gradually increasing in quantity and frequency of occurrence, the nearer pregnancy approaches its termination. Unless premature delivery take place spontaneously, or be induced, by the time labor comes on at term, the hemorrhage becomes truly terrific, and extremely dangerous to the woman, and almost certainly fatal to the child. The danger is, however, enhanced or diminished in proportion as the os uteri is inclined to dilatation or rigidity.

In consequence of the great importance of this variety of hemorrhage, that attaches to both the woman and foetus, we deem it necessary to devote a little time to its especial consideration, not only with a view of placing it before the mind of the student in as comprehensible a manner as we are capable of, but also, of familiarizing him with its details, so far as to enable him to undertake the management of a case, with an intelligent confidence in his qualification to conduct it to a successful termination, provided, such can be accomplished by the resources of our art. Believing this can be best done by presenting a concise history of the discovery of its cause, and the means adopted for its treatment, we shall briefly review the course pursued in regard to it by our predecessors. A variety of hemorrhage attended with great violence and danger, occurring before labor, was noticed by writers of great antiquity, and particularly by Hippocrates, who says "that the after-burden should come forth after the child, for if it comes first, the child cannot live, because he takes his life from it, as a plant doth from the earth." (Rigby.) This expression of the "father of medicine" was, doubtless, drawn from his belief that the presentation of the placenta at the os uteri, was owing to its falling down, after being detached from the situation it usually occupies in the uterus.

This notion was subsequently adopted by Guillimeau, and later by Mauriceau and La Motte, in the latter part of the seventeenth century.

In 1672, Paul Portal was the first to describe its attachment over the os uteri, and gave eight cases that came under his own observation, where recourse was had to artificial delivery, on account of the violence of the hemorrhage. In seven of the cases the

attachment was so great, that it required to be separated, and the delivery was effected by turning; in the eighth case, the head was forced through the placental mass. This discovery was so much at variance with the established ideas of the times, that it was enunciated with great caution, and failed to produce the impression upon the medical world that a revaluation of such magnitude would have done, had it been fearlessly and decidedly announced.

The new mode of delivery, by turning, introduced in 1665, by Ambrose Parre, was soon made available in overcoming the dangers arising from the hemorrhage incident to *placenta prævia*.

Grieffan was next to describe this unfortunate presentation, in a posthumous work published in 1734; he appears to have had no knowledge of Portal's work, first to describe it as existing in such a manner as to render hemorrhage inevitable. He met with ten cases, but like his predecessor, he mentioned the fact so cautiously, that it lost all its effect in establishing the circumstance of the occurrence in the minds of those who had not observed it personally. Out of eighteen cases found by these two writers, where the placenta was over the *os uteri*, they only described three as being attached in that locality, all the rest they regarded as the result of the fall of the placenta from its situation at the *fundus uteri*; in this respect, they followed the weight of authority recognized in their time. The three cases which they found attached, could be considered only as anomalies, while the fifteen in which the placenta was detached, and where it was supposed to have fallen from the upper part of the uterus, were esteemed the rule. Thus the effect of their observations was lost to science and humanity, for the want of a bold and independent enunciation of what they observed, unfettered by the trammels of authority.

Smellie, in 1752, gave a more precise description of the presentation, than had been done before, and mentioned either the edge, or middle of the placenta, as being attached over the *os uteri*. He speaks of it as being uncommon, and of so grave a character, as to require turning, to rescue both the mother and foetus from certain destruction. From the manner in which he treats the subject, the inference is, that he had no knowledge of what had been written upon it by either of his predecessors, as he makes no allusion to either of them.

Roederer was first to give prominence to this dangerous mal-position of the placenta. The work in which he gave a distinct and complete description of this species of hemorrhage, was published in 1766, three years after his death, by Wrisberg. He shows that the placenta may be entirely or partially attached to the *os uteri*; that, in the one case, the hemorrhage will be very profuse, and artificial assistance will be required; in the other, it will be slighter, and, in many cases, it may be left to nature.

Levret published a paper on placental presentation, in Paris, coterminously with Röderer's first edition, which, with the latter, were the first publications in which this form of hemorrhage was made a distinct subject for consideration, and by which the attention of the profession was called to its peculiar characters.

Dr. Rigby published an essay on Uterine Hemorrhage, 1775, in which he gave the most complete exposition of this form than had ever been given before, and to which but little has been added since. To him is awarded the merit of having first distinguished hemorrhages which occur before delivery, into *accidental* and *unavoidable*. This division is eminently practicable and appropriate, and places the subject in the clearest and most simple light in which it can possibly be placed. This distinction of hemorrhages has been almost, if not entirely adopted by every author of note who has written upon the subject since his time.

Though the subject had been mentioned by his predecessors, a century before the publication of his famous essay, it was in whispers so faint, that the sound had never reached his ears. The idea was as original with him, as though it had never been conceived before; notwithstanding, Burns and Hamilton, with a meanness characteristic of the most narrow-minded jealousy, charged him with having "published an abstract of the doctrines of Puzos and Levret, with the addition of some cases from his own practice;" (Burns), "that he availed himself of the discoveries of Dr. Smellie and Levret, while he continued to make the profession believe that his doctrines were original;" (Hamilton), the latter enlightened the world, by his penetrating genius, in 1836, and the former in 1837.

Dr. R. Lee, with a sense of justice as commendable as the meanness of the others was reprehensible, in the *Edin. Med. and Surg. Journal*, in 1839, gave liberal quotations from the published essay of Dr. Rigby, which completely vindicate him against these rude attacks. No one can read the simple, straightforward narrative he has given of the discoveries he made, in pursuing his investigations, and not feel convinced that his claim to originality is just. He avers that it was not until after the first addition of his essay had gone to press, that the dissertation of Levret fell into his hands. He just had time to make a note of Levret's researches, as additional evidence of the results of his own observations, and was satisfied to divide the credit, of originality, with him. In regard to his previous knowledge of the subject, he says: "It will, I trust, be sufficient for me equivocally to declare, that my original ideas on the subject were derived solely from my own personal observations and experience." He alludes to no other of his contemporaries than Levret, and to none of his predecessors, but declares he never heard of them, in connection with the subject.

If they spoke in timid whispers, too low to be heard outside the precincts of their own towns, Dr. Rigby cannot be denied the credit of boldly enunciating the great fact of the occasional attachment of the placenta over the os uteri, and the dangerous hemorrhages resulting from it, in thunder tones, sufficient to arouse the whole medical world to the great importance of the matter, and direct their attention to its proper and earnest investigation.

Uterine hemorrhages, occurring before delivery, will be further considered in regard to their *accidental* and *unavoidable* character; and all hemorrhages occurring between the end of the seventh month and the delivery of the child, where the placenta occupies other parts of the uterus than the cervix and os uteri, are to be considered accidental; that is, they are the result of some accident to the placento-uterine attachment, and that accident, as we have already remarked, may depend upon a variety of causes.

All hemorrhages connected with the attachment of the placenta over the cervix or os uteri, or what might be termed the placento-cervical attachment, occurring between the end of the sixth month and delivery, are *unavoidable*, because the inevitable expansion of the uterus during the last three months of gestation, and the necessary dilatation of the os for the passage of the foetus, must unavoidably disturb the attachment, to the extent of causing a greater or less degree of separation, which must result in hemorrhages of corresponding severity.

Placenta *prævia* constitutes one of the remote causes of hemorrhage before delivery, the consequences of which are unavoidable.

Exciting, or proximate cause. All uterine hemorrhages fraught with danger, occurring before delivery, whether accidental or unavoidable, bear an especial relation to the placento-uterine attachment. It was formerly maintained, that the hemorrhage, in either of its varieties, was due to a premature separation of the placenta from the uterine surfaces, as its *exciting, or proximate cause*. All the causes, general and local, that act remotely in producing accidental hemorrhage, may be superadded to the unavoidable one, viz.: the implantation of the placenta over the os uteri, and contribute towards the production and aggravation of the inevitable kind. Velpeau combats the idea that hemorrhage is produced by the separation of the placenta, but contends that the separation is caused by the hemorrhage. He holds that either of the foregoing, or any other cause tending to that end, may induce an irritation, causing a congestion of the uterine vessels concerned in the placento-uterine circulation, from which the sanguine exhalation takes place, into the uterus, as it does during epistaxis in the nose, under the influence of a local congestion.

Velpeau was driven to this conclusion, while combatting what he regarded—and very probably was—a grave physiological error, which was entertained from the time of Puzos, down to his own day,

that uterine hemorrhage was caused by the separation of the placenta from the uterus, which left large open vessels to pour their blood into its cavity. Not being a believer in the doctrine of a direct vascular communication between the uterus and placenta, he of course repudiates the idea of open-mouthed vessels emptying into the uterine cavity. As we have elsewhere stated, the placento-uterine circulation is maintained by exosmotic and endosmotic action, and not by vessels passing directly from one organ to another. He intimates that where there is no such direct vascular communication, there can be no hemorrhage, *per se*, from a mere separation of the placenta, but that an abnormal congestion is an indispensable condition; and with this, hemorrhage results as a consequence, without a previous separation. His notion is, that the blood exhales or transudes from the vessels of the uterus, and by accumulating between the uterus and the placenta, forces the latter from the uterine surface, and thus effects its separation. This may be, and probably is the cause in some instances of accidental uterine hemorrhage, and it may also be productive of the unavoidable kind before the expansion of the neck becomes sufficient, to cause the separation that must inevitably occur during the last months or weeks of pregnancy.

Now it by no means follows that a direct vascular communication and open-mouthed vessels are essential to hemorrhage, in connection with a separation of the placenta, because the blood can as readily exosmose, exude, or exhale from the surface previously occupied by the placenta into the cavity of the uterus directly, as it can indirectly, by first accumulating between the placenta and uterus, forcing a separation, and then escaping into the cavity, and thence through the os, vagina and external organs.

There is no doubt that both varieties of hemorrhage may occur under either of these circumstances; that it may, in one instance, cause a separation, as above described and maintained by Velpeau, and in another, be caused by the separation, and without the aid of lacerated and open-mouthed vessels. It does not appear that this view of the case ever occurred to our author, as he has made no allusion to it.

Hemorrhage from a rupturing of the vessels of the umbilical cord. The possibility of hemorrhage occurring from a rupturing of the vessels of the cord during labor, is not questioned, but that such an accident frequently happens, is by no means admitted; but when it is present it is of the most destructive character; the foetus being the most intimately connected with it is most likely to perish. Cases are recorded by De la Motte, Levret and Baudelocque, which are discredited by Velpeau, and Mesdames Boivin and La Chapell; in those of De la Motte and Baudelocque the children were born alive, which fact does not comport with the true character of hemorrhage from the cord; for, if the umbilical vein be ruptured, the

blood that is destined to sustain the foetus escapes into the uterine cavity, instead of passing on and continuing the foetal circulation, and the foetus dies, as would an air-breathing animal deprived of atmospheric air, by asphyxia. If one or both of the arteries should be ruptured, the foetus would survive longer, but would ultimately succumb; the woman would suffer alike in both instances, but the effects of the hemorrhage would not be so sudden and decisive as where the placenta were implicated. In the case reported by Levret, though the child was still-born there were other causes sufficient to account for its death. All those cases, when critically analyzed, were declared, by their reviewers above cited, to be only instances of ordinary hemorrhage, while Cazeaux believes the reports to be worthy of credence, and bases his belief on the weight of the authority, regardless of the results of analytical examinations in regard to their true characters.

"Nevertheless," says Vclpeau, "the umbilical vessels, and their branches ramifying upon the foetal surface of the placenta, are sometimes subject to rupture. I am in possession of several examples of the kind; but it is because they were previously in a diseased state, and that too generally in the early periods of pregnancy. Then, the foetus dies promptly, abortion takes place, and the hemorrhage is not discovered until the ovum comes to be examined. I have very often found embryos of six weeks, two months, etc., still enveloped in the membranes, separated wholly or partially from their cord, close to which were discovered one or more small clots of blood, at other times small varicose or aneurismal sacs, sometimes upon the cord, sometimes upon the secondary divisions of its vessels, the walls of which are exceedingly thin, and liable to be ruptured by the slightest effort. In an after-birth at full term, I have seen some of these dilatations that had been ruptured, and which communicated with a large clot covering a part of the placenta, and which had not lacerated the amnios; but it is easy to perceive that this kind of accident is but indirectly similar to those spoken of by authors."

A curious case of hemorrhage is related by Cazeaux, that occurred under his own observation. It was of four months standing, and resulted in premature delivery at seven months. The placenta was attached to the uterus, and its uterine surface smooth and normal; the cord was imperfectly attached to the placenta, but the membranes were entirely separated from it. Its foetal surface was "covered over by thick clots, and the debris of the torn and separated vessels that ordinarily ramify on its surface, could readily be detected, the loose extremities of some of these vessels was an inch long." The hemorrhage resulted from the separation of the membranes from the placenta. The same author relates a case reported by Dr. Parris, Professor of Midwifery in the Medical School of

Rheims, in which the cord, which was composed of separated vessels, was inserted in the membranes about three inches from the placenta ; the separated vessels, after traversing the membranes, entered the placenta at its circumference ; one of these vessels, a branch of the vein, was ruptured about one inch from the placenta. Upon the rupturing of the membranes, the escaping liquor amnii was found to be mixed with blood ; the labor terminated after four hours duration ; the child was dead, at which the Professor was surprised, and instituted an examination for the cause of death, which resulted in the discovery of the facts, as above stated.

Too short a cord, or where it is of usual length, but rendered too short, by being coiled around the neck, body or limbs, of the foetus, may become the cause of hemorrhage, either by occasioning a premature separation between the placenta and uterus, or from a rupture of its own vessels. Cazeaux argues, that from the mechanical arrangements of the uterine walls, placenta, and foetal body, it is almost impossible for a separation to occur during a contraction, but admits "it may take place before or during labor, prior to the escape of the waters, if the cord be very short and the movements of the foetus are very active."

Now it is evident that if the cord be of sufficient length to allow of the foetus being developed in its normal position in the uterus, there is not much danger of either its own vessels, or the placento-uterine attachment, being materially injured from undue tension, while the membranes continue entire, and the head remains above the superior strait. But after the waters are discharged, and the head passes into the cavity of the pelvis, the tension upon the cord becomes increased, it being firmly attached at its foetal and placental extremities. As the child descends through the straits, these points of attachment must necessarily recede from each other to a greater or less extent. Be sure the uterus contracts and causes the placental attachment to follow the one at the foetal abdomen, but this uterine contraction does not fully compensate for the separation of these two points from each other. As the body of the foetus emerges from the cavity of the uterus, it becomes straighter, which causes a greater tension of the cord, because the breech, which yet remains in the uterus, prevents its contraction sufficiently to compensate for the straightening out of the body. If the cord be tender, and easily ruptured, as we sometimes find it, especially at its insertion into the placenta, it may divide during the passage of the child, and cause its death, unless the accident be detected and timely care be bestowed upon it. Or if the cord endure the tension, the placenta may be dragged from the uterus, and a serious hemorrhage from that organ follow the expulsion of the child. If the contraction, during the expulsive stage, should be imperfect and far apart, and hemorrhage be present from too short a cord, instrumental

assistance would be imperiously demanded. We have no unity with Cazeaux's notion, that during labor, before the evacuation of the waters, where the cord is very short, it may be severed by the active movement of the foetus. We have no idea that the foetus in utero, plays the part of a prancing colt, that snaps his halter to free himself from the confinement of his stable.

The condition of the Os Uteri, in connection with Flooding. Our chances of success or otherwise, in the management of a case of flooding, depends greatly upon the condition of the uteri. It may occur under either of the following circumstances, viz.: Where the *os uteri* is *dilated, or soft and dilatable*, or where it is *undilatable and rigid*. And it should be ever borne in mind that this distinction is of the greatest practical importance.

1. *Symptoms of Uterine Hemorrhage.* When hemorrhage results from general or constitutional causes, it is usually accompanied by corresponding constitutional symptoms. If it arise from a plethoric state of the system, the usual symptoms of plethora precede its occurrence, for a longer or shorter time. If it should supervene at attack of fever, or any other constitutional disorder, the symptoms of such fever or disorder would precede it almost as a matter of course. Should it occur in connection with any prevailing epidemic, its appearance would be foreboded by the symptoms characterizing said epidemic. If it should accompany an ordinary cold, or common catarrhal affection, it would be preceded by the symptoms of such an affection. In all the preceding instances, though certain symptoms may be the fore-runners of hemorrhage, they cannot be strictly regarded as the symptoms of hemorrhage; but only of such morbid conditions as they typify, whether hemorrhage be present or not; it being, in such connections, only an incidental or accompanying result or circumstance, in fact only a symptom itself.

If it be caused by local uterine congestion, the symptoms of such congestion will be most likely to precede it, sometimes only a few hours, and at other times for several days, as a sense of restlessness in the limbs, general uneasiness, expressed frequently as nervousness and signs of hysteria; there is a sense of weight and fullness in the pelvis, with a deep-seated aching or pain, alternate chills and flashes of heat over the body, frequently extending to the head; the patient often complains of giddiness or vertigo, during which the face is flushed and red. The pulse becomes stronger, fuller and more active, there is generally a febrile state of the system, with coated tongue, thirst, etc.

Where hemorrhage results from an accident, after the seventh month, such as a fall, blow or other injury, or from a strong mental emotion, as fright, rage, grief, etc., it may succeed the accident or emotion immediately, or it may not occur for several days after; where such a delay is observed, it generally does not come on until

the arrival of what would have been a menstrual period, had pregnancy not been present; during this delay some of the foregoing symptoms of uterine congestion, or perhaps the most of them, may be manifested; their presence, under such circumstances, must be regarded as the harbinger of evil, requiring the adoption of such precautionary measures as may be necessary to arrest their progress.

It very often occurs, that severe hemorrhages come on suddenly, without any premonitory symptoms, or known cause, which prove equally as destructive as those that give warning of their approach.

Hemorrhage may take place between the end of the seven month and the close of the term of gestation; it may come on gradually, more or less escaping all the time, which may increase, little by little; or remain apparently stationary, and continue for several days; during which a considerable quantity of blood may be lost without producing any very perceptible injurious effect, or seeming to accelerate the approach of the parturient process. But such favorable hemorrhages are not very common; their general course is, even when they commence moderately, to increase in violence until arrested by proper and well-directed efforts, or are terminated by the birth of the child, or the destruction of both the woman and child.

When they come on suddenly and violently, without any previous symptoms or known cause, they may prove fatal in a very few hours, unless arrested by the employment of the most energetic and decisive means.

External and Internal Uterine Hemorrhage. Hemorrhages from the uterus are known as external and internal. External is when the blood becomes visible, by being discharged externally. This is sometimes really terrific, from the enormous quantities of blood that are poured out of the system; but it is, nevertheless, not so dangerous as the internal, because its true character can be seen, and means proportionate to the emergency can be timely used to counteract it.

Internal Hemorrhage. This is when the blood is retained within the cavity of the uterus, which renders it invisible or concealed hemorrhage. This variety is by no means uncommon after delivery; but that it exists, to any serious extent, anterior to that event, admits of very strong doubts. During the whole period of gestation, the uterine cavity is well occupied by the ovum, so much so, that there is no space to spare for an accumulation of blood sufficient to jeopardize the life of the woman, or interfere materially with her convenience. In cases of alleged internal hemorrhage, before delivery, the blood is said to collect between the placenta, or membranes and uterus, in the part corresponding with the site of the placenta, and by compressing the ovum on one side,

and fitting to the concave walls of the uterus on the other, a lentiform coagula may be formed, which may attain a greater or less size, by compressing the ovum out of shape on one side, and causing the uterus to distend upon the other. It appears to us that nothing less than an impervious os uteri could cause the blood to be retained in the uterus, until the accumulation was sufficient to force a distention of its strong, resisting walls; for otherwise, the opposing forces of the ovum, on the one side, and the uterine substance on the other, would certainly press the blood down through the os, where the resistance would be incomparably less than that afforded by the strong, thick structure of the uterus, which expands suddenly with the greatest difficulty. Notwithstanding the apparent impossibility of internal hemorrhage existing to any great extent, it is admitted by Mauriceau, De la Motte, Levret, Baudelocque and Merrimen; while it is rejected by Velpau and Mads, Boivin and La Chapell. Let it be distinctly understood, that we freely admit that in the early months of pregnancy, a small accumulation of blood may be deposited, in the form of coagula, between the membranes and the uterus, or between the imperfectly developed placenta and the uterus, enough, perhaps, to compromise the life of the foetus; and even if not sufficient for this, the coagula soon acts as a foreign substance, and provokes uterine contractions, causing abortion, and in this way secures its own expulsion, with the embryo or foetus, and its secundines. Neither do we doubt that there may be a small external discharge, and, at the same time, a corresponding quantity of blood retained in the uterus by the presence of a clot in the os, which coagulates, and ultimately, in like manner, causes the uterus to contract and expel the foetus and retained blood together. But that it can exist, to the extent of distending and distorting the uterus, and compressing and deforming the ovum and destroying the woman, without any external appearance during the last weeks of pregnancy, is exceedingly problematical.

2. *The Prognosis of Uterine Hemorrhage*, before delivery, is very uncertain, and depends very much upon the condition of the os uteri, the character of the hemorrhage, and the facility with which delivery can be effected. Hemorrhage occurring between the commencement of pregnancy and the third or fourth month, generally terminates in abortion, without necessarily endangering the life of the woman, while that of the foetus is almost always sacrificed. Though it has occurred in the practice of almost every experienced accoucheur, that hemorrhages of great profusion, have occurred and passed off, without disturbing the process of gestation, so far as to cause abortion, or interfere with the well-being of the foetus.

The safety of the woman, in these early hemorrhages, is due to the diminutive size of the uterine vessels, at this period of gesta-

tion, and the small quantity of blood transmitted through them; the hemorrhage must continue a considerable length of time, and to the full extent of which the vessels are capable of affording, before the life of the woman is put in jeopardy. There is always time allowed, for the employment of means adequate to its arrest or control, before any serious results occur. Repeated floodings and abortions, soon impair the general health, and, if long continued, render the woman a permanent invalid.

Hemorrhages, occurring after the end of the seventh month, are necessarily more dangerous, as regards the woman, but less so in reference to the foetus, than those occurring at an earlier period, because the vessels are larger, and allow a greater quantity of blood to flow through them. The safety of the foetus is enhanced by a prospect of its surviving a premature delivery, yet it may perish, as is often the case; but before the sixth month none are saved, and very few before the seventh. As a rule, the danger of the woman increases as that of the foetus diminishes, and *vice versa*.

The quantity of the blood lost, is not always to be taken as a proof of the imminence of the danger, because many women will endure the loss of immense quantities, while others will succumb to a comparatively small amount; the prognosis should be based upon the effects produced, rather than the extent of the discharge.

If we see manifested the phenomena arising from an excessive loss of blood, as a rapid or gradual decline in the strength and regularity of the pulse, and a feebleness and tremulousness to mark its character; if the face loses its color, and becomes pale and the skin cool; if a dimness of vision, or blindness, be complained of; and a ringing in the ears; if there be great thirst, and a constant desire for fluids, with a sense of weakness at the stomach; yawning and stretching; nausea and fainting; a twitching, convulsive motion of the muscles, and even general convulsions; when these phenomena follow each other in succession, which they sometimes do very rapidly, the prognosis is highly unfavorable, whether the quantity lost be great or small.

Where the discharge has been excessive, and the patient reduced to a very low degree of strength and vitality, and the efforts to staunch the hemorrhage have proved apparently successful, the utmost caution is necessary, lest our hopes of a final triumph be dissipated by the recurrence of a relapse, that may prove fatal in a very short time. The intermission may be deceptive, and the few minutes immunity from the exhausting flow, may be appropriated by the system, for the collection of strength, only to enable the attack to resume its work of destruction with renewed vigor, against which the spent energies of the constitution can no longer contend.

Even if an immediate relapse should be avoided, great care will be required to guard the patient against the secondary effects of a severe hemorrhage, such as effusions, local and general, chronic inflammations of the uterus and serous structure; various manifestations of nervous diseases, etc., etc., which may ultimately shorten her life and render her last days immeasurably wretched.

As a moderate haemoptysis may relieve the congested state of the lungs, and leave the patient in a better condition after the attack than before it, so may a moderate metrorrhagia relieve a congestion of the uterus, and enable the woman to proceed to the normal close of gestation, with greater safety than she might have done had the attack not occurred. This spontaneous local depletion may arise from the cervix uteri, or the body of the uterus, unconnected with the placento-uterine attachment; if so, there is not much danger of a recurrence of an attack, unless there be a recurrence of the congestion.

But it is not very easy to decide in a case of metrorrhagia, occurring towards the close of gestation, whether the blood proceeds from the mucous surface of the vertex or body of the uterus, or from the point of placento-uterine attachment; if from the latter, and the hemorrhage be arrested, the greatest care will be required to avoid a relapse. Inasmuch as there is no means of determining with any degree of accuracy, in regard to the source of the evacuation, the safer plan would be to enforce the most rigid prophylactic measures, with the view of protecting the patient against a probable return of the hemorrhage, and if we err, it is better that the error be on the side of safety.

3. *Treatment.* Called to a case of uterine hemorrhage, between the end of the seventh month and the close of pregnancy, or during parturition at term, the *first* duty of the accoucheur will be to ascertain the condition of the os uteri; for without this knowledge he cannot hope to prescribe with any certainty of success; in fact, without it, the most intelligent course we can pursue toward controlling the flow, can, in the very nature of the case, be but the height of empiricism. The os may present one of two conditions; it may be contracted and rigid, or dilated or soft and dilatable. Now two very different courses of practice are here indicated. The course that may be advantageously pursued in regard to one, may be highly detrimental if applied in the presence of the other, and *vice versa*. If the os uteri be found contracted and rigid, no attempt to empty the uterus by artificial means, must be made; no skill nor dexterity can be employed sufficient to overcome the physiological condition that maintains the closure of this orifice, and any efforts in that direction would only tend to complicate the case, and add new difficulties to the one already existing. There can be no condition nor circumstance, however urgent or threatening, that will

justify an attempt to open the os, and enter the uterus by force. This is an obstetrical maxim that should never be disregarded.

Being deprived then of the opportunity of employing the only certain means of arresting the hemorrhage, viz., a speedy delivery, we must have recourse to what other agencies we can make available, in controlling or moderating, if not in arresting, the flooding. The first injunction will be, that the patient observe the most perfect quietude in the recumbent posture, on a hard bed or mattress. It is recommended to have the hips elevated higher than the head and chest; this is sometimes done by placing pillows under the hips, and sometimes by elevating the foot of the bedstead some eight or ten inches, and keeping it so, by placing the feet of the posts on something solid, and it should remain in this condition during the continuance of the activity of the hemorrhage. This expedient is often attended with decided benefit, and should not be neglected in the treatment of the graver forms of flooding. The room should be kept darkish, quiet, cool and well ventilated. The woman's diet, if any be needed during the attack, should be simple, cool and of the blandest character. The drink should be cold, acidulated water; cold lemonade is almost always very grateful to the patient.

If the debility and exhaustion, from the loss of blood, be excessive, a teaspoonful of good brandy may, nay, should be added to each draught. Cloths wrung out of ice-cold water and vinegar, should be applied to the vulva and lower abdomen, and changed as often as they become warm; at the same time a hot brick, or sand bag as hot as can be borne, should be applied to the sacrum. There are but few applications that act more promptly in arresting uterine hemorrhage than this. If these means fail in controlling the discharge, and if the woman be strong and sanguine, we are recommended to take six or eight ounces of blood from the arm. This can only act beneficially by aiding the existing hemorrhage in subduing the heart's action, and in this way controlling the force of the circulation. Now as the aim should be to husband our resources, and save as much blood as we can, of what is remaining in the system, it has always appeared to us as very bad practice to voluntarily aid in reducing the strength of the patient, by the further abstraction of the vital fluid, that is spontaneously flowing away at an ungovernable rate. We admit that to weaken the action of the heart and arteries, when by its force and frequency it augments the discharge, is a desideratum of the first magnitude, but as we have so many other resources for accomplishing this end, we cannot but regard venesection as one of the most mischievous agencies that we can employ, and should never be used except where no other means are available.

Nauseants are equally as efficacious in controlling the heart's action, as is blood-letting, and much more harmless, because they do

not draw off the blood, every drop of which will be needed to aid the work of recuperation, after the arrest of the hemorrhage. Ipecac., in nauseating doses, is highly recommended in uterine hemorrhages; it acts promptly in moderating the force and frequency of the pulse, and of course in limiting the extent of the evacuation. Lobelia inflata has a still greater effect as an arterial sedative; it acts with great promptness in moderating hemorrhagic effusions, when administered with boldness and decision. The following proportions of tinct. lobelia and tinct. of capsicum may be relied upon in most cases of hemorrhage, and seldom fails to make a decided impression for the better. The capsicum being almost entirely a local stimulant, exerts its greatest power upon the stomach, and so far counteracts the relaxing effects of the lobelia, as to render the latter article almost innoxious, while at the same time it exerts a powerfully controlling influence over the functions of the arterial system.

R Tinct. lobelia inflata, $\frac{3}{2}$ j.
Tinct. capsici, $\frac{3}{2}$ ss. M.

ʒ. Take a teaspoonful every fifteen minutes until the hemorrhage is restrained. It may then be given at longer intervals, say of from half an hour to an hour. Should vomiting ensue, the dose must be diminished, and the intervals increased. The medicine should be diluted with twice the quantity of water, and sweetened with loaf sugar.

The hemorrhage will not only be found to be brought under the control of the medicine, but the os uteri will also manifest a marked degree of relaxation, from its use. Digitalis has also been used to modify the heart's action in uterine hemorrhage. The erigeron, or *flea-bane*, is likewise known to act with decided benefit in all hemorrhages, but more particularly so in those of the uterus, it is employed by many practitioners, to the almost entire exclusion of every other remedy, and with the most satisfactory results. It is usually employed in the following formula :

R Ol. erigeron, $\frac{3}{2}$ j.
Syrup acacia, $\frac{3}{2}$ xvj. M.

ʒ. Take a teaspoonful every quarter, half hour, or hour, according to the severity and urgency of the case.

All the foregoing remedies act by lessening the force and frequency of the circulation, and in so far, they are valuable substitutes for the lancet. They are capable of accomplishing more than that instrument, towards arresting the hemorrhage, without adding to the debility of the patient, by causing an additional loss of blood.

Astringents afford the main source of reliance for some practitioners, and alum, acetate of lead, tanic acid, sulph. amon. et ferri, persulphate of iron, etc., at different times, have been held in high esteem by different physicians, in obstinate metrorrhagia.

The application of tight ligatures around the lower extremities, to interrupt the return of the blood to the pelvic cavity, was employed by Rhodion, Hamilton, and others, but we are of the notion that the expedient is too mechanical to be of much service in arresting the hemorrhage.

Velpeau speaks in terms of high commendation of the employment of a sinapism between the shoulders, as one of the most powerful and useful revulsives that can be recommended. There can be no doubt that its action is analogous to heat applied to the sacrum, as above directed. Dr. John Chapman, of London, esteems hot water to the spine, by means of his hot water, gum elastic, spinal bag, as the most prompt and efficient means known, of arresting uterine hemorrhage, and we have the testimony of several experienced practitioners of this city to the same effect.

These revulsive agents have been resorted to in very extreme hemorrhages, occurring at different periods of pregnancy, from the third month, to the parturient efforts at term, and always with the most satisfactory results. As either one or the other of them, can always be rendered available; their employment should never be neglected in a case of severe and threatening hemorrhage.

4. *The Tampon.* This consists of a plug, composed of some suitable material, for stopping up the vagina, and thus by mechanical means arresting the flow of blood. When studying the management of abortions, (page 406,) the sponge was recommended as the most appropriate substance for the tampon or plug, and it was there directed to place it up against the os uteri, etc. Dr. Dewees says it is never necessary to carry the tampon as far as the os uteri; so, if the young practitioner should be unable to follow the direction we have given, he can find very high authority for his failing to do so. The object is to close up the vaginal canal as perfectly as possible, without causing pain or inconvenience, by the distention of its walls, as near where the blood enters it as practicable. It is left for each practitioner to decide for himself whether this can be best done by merely introducing the plug within the external orifice, or carrying it up close against the os uteri, where it can receive, by absorption, the blood, directly as it escapes from the uterus, and by stagnating it there, cause it to commence coagulating.

It is by the coagula, extending from the obstructing body, in the vagina, to the source of the hemorrhage, that the latter is arrested; the nearer the point of escape of the blood, the coagulation commences, the sooner will it reach the source of hemorrhage, and the sooner will the arrest be effected. A purse-shaped bag, well lubricated, and filled with astringent substances, has been employed by some. M. Désormeaux prefers the bag, and has it introduced empty, and then filled with lint or tow, or some

similar substance, and secured with a T bandage. This fixing requires too much time, and its arrangement will be attended with too great inconvenience, where the blood is flowing rapidly, as it often does. It frequently occurs that we have no time to be particular in the selection of material for the plug, but are required to seize upon any thing that is at hand, as a small napkin, a rag, or any thing else that can be made to answer the purpose, even to the handkerchief out of our pocket. Sometimes where the plug occupies only the upper part of the vagina, if it be sufficient to fill that part effectually, and prevent the blood passing between it and the vaginal walls, it will be all that is required; but if this should prove insufficient, more plugging will be required.

Let it be remembered that this is a most effectual mode of stopping uterine hemorrhage, occurring before delivery, and if it fail, the fault is in the manner of its application, rather than the means itself. To attain its full benefit, then, it may possibly become necessary to pack the vagina full and tight, throughout its whole length, and secure it there by a T bandage; this will, of course, produce uneasiness and more or less pain, but, if unavoidable, the patient must be encouraged to endure it for a time, as the less of the two evils. This extreme course should not be persisted in, however, so far as to involve the vagina in the danger of inflammation, but the plugging may be partially removed after a few hours, to the extent at least of affording relief from distension, in view of the probable necessity of having to remove a portion of the tampon for this purpose, it would be best to constitute it of separate pieces, so it may be removed gradually. If it be found, after relieving the vagina of a portion of its filling, that the hemorrhage recurs briskly, and that the arrest has not become permanent, the canal must be again filled, and secured as before, and allowed to remain until the object in view be attained. In the meantime, the foregoing remedies should be employed with as much energy as though the tampon were not used; by the vigorous exhibition of these, the vagina may be the sooner relieved of the tampon, in consequence of the permanent arrest of the hemorrhage. While the plug acts mechanically, and entirely so, in preventing the blood from flowing through the vaginal canal, it is capable also of accomplishing very important physiological ends. By irritating the vaginal nerves, it, through the reflex action thus produced, acts as an excito-motor agent to the uterine fibres, causing their contraction, and in this way facilitating the expulsion of the foetus. After becoming convinced, from the action of the uterus, as manifested by the increased frequency and strength of the pains and the diminution of the drain through the tampon, that the uterus is contracting, and the flooding arrested, the removal of the tampon may be commenced, by displacing the T

bandage, when it will pass away slowly and gradually, by the spontaneous contraction of the vagina.

The foregoing treatment, including the use of the plug, is adapted to unavoidable as well as accidental hemorrhages, where the os uteri is undilated and rigid.

In cases of accidental hemorrhages, when the os uteri is dilated or easily dilatable, if the hemorrhage be not alarmingly excessive, some of the remedies that have already been recommended may be used, as dry heat to the sacrum, cold to the vulva, the ipecac., lobelia and capsicun, erigeron, or some of the astringents. At the same time, should the contractions be weak and far apart, the internal surface of the os uteri should be titillated, by introducing one or two fingers into it, and moving them around with a due degree of rapidity, and with some pressure, and thus promote uterine action. This may also be aided by rupturing the membranes, and allowing the uterus to contract down on the body of the foetus, which frequently restrains the flooding, to within the limits of perfect safety. This being accomplished, the labor may be left to the powers of the organism. Should the hemorrhage, however, be such as to give cause of alarm, and the head occupying the cavity of the pelvis, the forceps should be applied at once and the delivery effected as speedily as possible. Should the head be found above the superior strait, the hand should be introduced, and the child turned and delivered by the feet. It should be borne in mind that the danger is in proportion to the ease and facility with which this can be accomplished, for if the contractions be such as to interfere materially with the operation, they also restrain the hemorrhage by compressing the calibre of the vessels, and preventing the flow, through them, of so great a quantity of blood. On the contrary, should the uterus remain flabby and uncontracted, and the hand meet with but little or no resistance in the uterus, the vessels remain undiminished in size, and the blood flows through them with unabated velocity. This is a very unfavorable condition of things, requiring prompt and energetic action on the part of the accoucheur.

Four different modes of action have been recommended in cases of unavoidable hemorrhage, or when the placenta is attached over the mouth of the uterus. 1. To search for the edge of the placenta nearest the os, and separate it and push it aside, so as to pass the hand up by it to seize the feet. 2. To perforate the placenta, and pass the hand up through the perforation. 3. To separate the placenta, without regard to the nearest edge, and pass the hand up by it and seize the feet. 4. To remove the placenta entirely from its attachments, and deliver it before the child.

The first plan would require more time to search for the edge of the placenta, than we would be justifiable in losing in a case of great urgency and danger.

The second would be attended, probably, with no less loss of time, and would materially augment the amount of hemorrhage, which would be certain to destroy the life of the foetus, and greatly endanger that of the mother; the child would have to be delivered through the opening in the placenta, which, besides causing great delay, would lacerate it to a very great extent, causing an amount of flooding equal to its entire removal, without being attended with the advantages resulting from its previous delivery.

The third is less objectionable than either of the preceding modes of practice, but it must necessarily be attended with a great increased loss of blood, without the compensating advantages incident upon its entire removal.

The fourth, though not without objection, is preferable, in our opinion, to either of the foregoing. If the delivery is attended with much delay, the child's life is pretty certain to be sacrificed; but not a great deal more so, than where pretended efforts are made to save it, which, from the very nature of the case, can be but little other than ineffectual, while that of the mother is put in far greater jeopardy in consequence of such efforts. When the os uteri is fully dilated, or very soft and dilatable, and under no other circumstances, should turning be attempted; by separating the placenta and removing it at once, we have it out of the way, and our movements are not impeded or delayed by its presence; the hand can, consequently, be more easily and speedily introduced, and the feet seized and brought down. As soon as the hips engage in the os uteri, they act as an effectual plug, and arrest the hemorrhage at once; after which some authors direct that the labor be left to the unassisted effort of the uterus. This course may be preferable sometimes, especially if it be contracting efficiently; otherwise, the delivery should be completed by a continuation of the operation. The loss of blood attending the prompt separation and removal of the placenta, must be great, necessarily; but the facility afforded, by the entire absence of the after-birth, at the mouth of the uterus, to the operator, in turning, more than compensates for the sudden loss of blood, in the saving of time, and, consequently, shortening the duration of the hemorrhage, which, perhaps, not quite so profuse as in the other case, but, from a protracted continuance, amounts to a greater waste, in the end, and is fraught with more danger, than where the delivery can be effected speedily, though the flow be excessive while it lasts; and, furthermore, where the labor has advanced so far as to make turning impracticable. Where the head has engaged in the superior strait, or occupies the pelvic cavity, where the membranes are ruptured, and the pains are efficient, the most effectual way of arresting the hemorrhage, is to separate and remove the placenta, and let the head enter the os uteri, where it acts as an efficient plug; the shoulders, trunk and

hips, as they pass through the os, all press upon the surface made bare by the removal of the placenta, and restrain the hemorrhage. Should the head be found occupying either the brim or cavity of the pelvis, with the membranes entire, and the contractions strong and regular, the membranes should be ruptured, the placenta removed, and the head be allowed to enter the os uteri, as above intimated. When this occurs, and the pains are regular and efficient, and the hemorrhage found to be restrained by the head pressing in the os uteri, the labor can be safely left to the spontaneous efforts of the uterus; but, if the flooding continue without much abatement, with the head occupying the cavity, it should be seized by the forceps, and the delivery effected as speedily as possible.

It should not be forgotten that, during our efforts at emptying the uterus, the dry heat to the sacrum, or mustard to the spine, and such other remedies as may be at hand, should not be neglected, as all the resources we can make available may be required to rescue the patient from the jaws of death.

Should the woman become greatly exhausted, pale and bloodless, her strength and vitality must be supported by the frequent administration of brandy and water, carb. ammon., wine whey, etc. If the extremities become cold, dry heat must be applied to the feet, and the hands be put in warm water.

SECTION II.—CONVULSIONS.

Puerperal convulsions have been described by authors, as consisting of three forms, viz.: the hysterical, epileptic and apoplectic forms. The latter is more frequently connected with labor, rendering it dystocial, while the former are generally met with during gestation.

Eclampsia, or the epileptic form of convulsions, as does also the hysterical form, frequently occur during labor, as well as through the course of gestation. In fact, one or the other of these forms more often complicate labor than the apoplectic; but, as the latter is seldom encountered, except in connection with parturition, we refrain from considering it in any other relation than as a cause of dystocial labor. When either of the former occurs during labor, previous to the dilatation of the os uteri, it must be treated as though labor were not present.

Apoplectic convulsions, when complicated with labor, very rarely occur during the early part of the process, but towards its close, and sometimes not until after its termination; though there may be genuine apoplexy manifested in connection with labor, presenting all the phenomena of that terrific malady, and may, perhaps, be due to the gravid state of the woman, but in which are absent the recurrence of the convulsive paroxysms. The patient may or may

not have convulsive struggles of greater or less violence in the incipiency of the attack, from which she passes into a profound coma, with heavy stertorous breathing, and perfect unconsciousness and loss of muscular motion, out of which she will probably never arouse, especially if the attack be one of usual severity. Such apoplectic fits may occur in either sex, or in women who are not pregnant, or at any period of pregnancy, or during labor, or after its termination. Pregnancy, or labor, or the state of the system, subsequently to that process, may be instrumental in their production, or it may not. But it is not of this form of disease that we purpose to treat in this connection.

Puerperal convulsions, of the apoplectic form, are where the paroxysms or fits recur at intervals of greater or less regularity, between which there is a state of coma and unconsciousness, of greater or less severity. Though the attack does not generally come on in the early part of labor; it nevertheless does so sometimes; indeed we once knew an instance where the woman was seized with this form of convulsions, at term, without any premonitory symptoms, as she was attending to her domestic duties, and fell upon the floor. She had some twenty-one fits, before she was delivered, which was effected by the aid of the forceps, twenty-four hours after the incursion of the attack—during all this time, and for nine days afterwards, she remained perfectly unconscious, and in a state of complete coma, from which she ultimately very gradually recovered.

Cause. They generally occur in those whose form, temperaments, and habits, are considered favorable to the development of apoplexy, as those of short stature, thick set, short necks, and of close dense fibre. Constipation, luxurious living, and highly-seasoned, stimulating diet and beverages, are all predisposing causes. Opposite conditions of the ganglionic nervous centres, as hyperæmia and anæmia may favor the occurrence of puerperal convulsions of the apoplectic form. In fact there can be but little doubt, that the primary cause of all convulsive movements exists in these ganglionic centres, whether connected with gestation or parturition or not. Where either of these conditions exists, if allowed to remain unexcited, they may not manifest their legitimate results; but when the nervous irritation incident to pregnancy, and the still greater agitation consequent upon parturition, are added to the preexisting ganglionic hyperæmia or anæmia, the nervous excitement passes from under the control of the will, and the muscular system is thrown into irregular spasmodic contractions, and where the brain becomes involved in the disturbance, volition is suspended in a degree proportioned to the intensity of the cerebro-spinal and nervous agitation. Hence when the nervous disturbance is moderate we have the hysterical form; where it is more severe,

the epileptic variety is manifested, and where it is still more intense the apoplectic form is developed. Thus it is apparent, that the various forms of puerperal convulsions are but different phases of the same disorder.

Albuminuria, is at present attracting a large share of attention, as a cause of puerperal convulsions. As this is only a symptom of a degenerated or congested state of the kidneys, it can be held in no higher estimation, than a mere index pointing to that affection. How far diseased kidneys may favor the development of these convulsions, by reflex action, or by failing to eliminate the blood of its urea, which is acknowledged to be a powerful nervous excitant, or by causing a separation of albumen from the blood, has not been fully determined; or how far the degeneration of the kidneys may depend upon excessive or deficient nutrition in the ganglionic centres, supplying them with nerve-power, remains undecided. From the meager statistics collected on the subject, the facts point equivocally to a marked coexistence of the two affections, whether that be the result of cause and effect or not. M. Blot, MM. Deviliers, and Regnault, have reported sixty-one cases of albuminuria, of which eighteen had puerpural convulsions, from these data, and his own observations, Cazeaux thinks he comes near the truth in saying that one out of every four or five with albuminuria, will be affected with convulsions.

While there are many who have albuminuria, during pregnancy, and at the time of parturition, and escape puerperal convulsions, all, with very few exceptions indeed, who are attacked with convulsions, have albuminuria.

It is maintained by Cazeaux that the organic condition of the kidneys, that is productive of albuminuria, are certainly the most, and indeed the only ones, favorable to the production of convulsions. This proposition he considers incontestable, and refers the œdema of the lower extremities, and especially the dropsical infiltration of the body, upper extremities, and face, which authors regard as predisposing causes of eclampsia, in common with the generality of writers, to an alteration of the urinary secretions, but which eventuate in convulsions only, when accompanied with albuminuria.

We have seen many cases of œdema of the lower extremities, and some with the other parts of the body extensively involved in dropsical infiltration, unaccompanied by a single symptom of convulsions; but one which we reported for the *University Medical and Surgical*, for September, 1865, under the caption of "A Case of Complicated Labor," is of a different character.

Mrs. S. A. T., aged 34, *primipara*, at about the fifth month of gestation commenced to be effected with œdema of the feet and legs, which kept on increasing during the remainder of the term, extend-

ing to, and involving the labia, and thence to the abdomen, thorax, arms and face, attended, sometimes, with a sense of suffocation upon lying down, more particularly so during the latter weeks of the term. Health in other respects, very good, appetite excellent, and sleep not much disturbed. The effusion was no doubt controlled by treatment; the renal secretions were but little changed, either in regard to quantity or quality. Her diet was plain and unstimulating, and the free use of liquids unrestrained.

June 19th.—She was taken in labor at 6 o'clock in the morning, pains at first slight, but continued at regular intervals of from five to ten minutes, gradually increasing in severity during the day. We were called to her about 8 o'clock in the evening; found the os uteri fully dilated, and membranes protruding, and the vagina and external parts duly relaxed. In half an hour after, the membranes were ruptured during a very strong pain, and an immense quantity of water was forcibly discharged, carrying down with the current a loop of the umbilical cord. The head duly engaged the superior strait, and soon occupied the pelvic cavity, the cord still pulsating. Hopes were entertained of a speedy delivery, and the preservation of the child's life. But unfortunately at this point, the pains began gradually to decline in efficiency, though recurring with great regularity at intervals of about five minutes. They now assumed more of a neuralgic character, were quite severe and correspondingly inefficient.

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The labor progressed without the occurrence of any incident worthy of notice, except the tardy advance of the head, and occasional complaints of vertigo upon raising her head from the pillow. There was almost constant eructations, and the discharge of great quantities of flatus from the stomach, with sickness and vomiting, circumstances by no means uncommon during the latter stages of labor, until about five and a half o'clock on the morning of the 20th, when she suddenly rose to the sitting posture and broke out in a loud maniacal laugh, which was succeeded by perfect delirium, evinced by a constant gibbering and occasional incoherent and unmeaning expressions. The occiput was now under the arch of the pubes, and the apex separating the labia externa. The pains from this time became weaker, the intervals longer, and the delirium more and more intense, until a slight convulsion was manifested. The face was suffused and swollen, the pulse full and bounding, the skin burning hot, and dripping with perspiration. Believing that conservative obstetrics had about exhausted its resources in this case, it was determined to resort to more positive and decisive measures.

Yielding more to the weight of authority than to our own con-

victions of duty, we opened a vein in the arm from which the blood was allowed to run until there was a decided impression made upon the pulse, which was attended by a subsidence of the flush of face. Immediately upon the blood being stopped and the arm bandaged she had another convulsion of much greater violence and duration. There was an entire absence of consciousness, after the first manifestation of delirium, but a great deal of violent, involuntary muscular motion, but not of a convulsive character, except during the fits. By the free application of ice-water to the head, the heat was greatly abated, and no further convulsions supervened, but she remained unconscious and restless, tossing herself about from side to side. It was determined to place her under the influence of an anæsthetic, and deliver by the forceps. The assistance of Dr. J. D. Linton, late A. A. Surgeon U. S. A., brother to the patient, was solicited, who administered chloroform. After being brought fully under the control of the anæsthetic, the forceps were readily adjusted. The pains having almost entirely subsided, the delivery was left wholly to artificial means, but was duly accomplished with but very little delay; the child was large and still-born, it having perished from compression of the cord, which measured forty-eight inches in length; the placenta was very large, but easily removed.

The patient remained insensible during most of the day, with occasional lucid intervals; rested well that night, and on the following morning was entirely rational. For several days after delivery she was subject to a profuse watery diarrhœa; as it did not appear to impair her strength materially, it was not interfered with, but allowed to continue, as a natural means of carrying off the great effusion under which she had so long labored. The diarrhœa terminated spontaneously, and her restoration to health was as speedy as could be expected under the circumstances.

Aside from the general interest of this singularly complicated case, it is worthy of being recorded, as affording another instance of the coexistence of dropsical infiltration and puerperal convulsions. Whether there was albuminuria present or not we cannot say, as there were no tests of the urine made, but have no doubt, from the appearance of the patient and the peculiarities of the case, as observed during the last four months of pregnancy, and at the time of labor, that it existed to a very great extent.

Young women, in their first confinements, are more liable to convulsions than in their subsequent ones.

All the causes that may produce either of the other forms of convulsions, during pregnancy, may also give rise to the apoplectic variety during parturition, when excited by the agitations of that process.

1. *The Symptoms preceding an Attack.* All the symptoms

that mark the approach of either of the other forms, during pregnancy or labor, may also announce the coming of this, as pain in the head, vertigo, etc., for several hours or days previously to the attack. It commonly occurs, however, that these symptoms, together with flushed face and injected eyes, are manifested during labor, and most frequently during the third or propulsive stage. There is a vast difference in the symptoms of apoplectic convulsions in different individuals, which is perhaps depending upon a difference in the condition of the nervous system. While coma, insensibility and stertorous respiration distinguish this form from either of the others, there are many instances where there is but very little convulsive motion. The body and extremities are thrown about, or convulsively agitated for a short time, when the patient passes into this comatose state, in which she lies undisturbed by any subsequent fits, while there are others, in whom are manifested an equal degree of coma, insensibility and stertor, but who, at regular or irregular intervals, are seized with the most frightful and contorting convulsions. Often the fits come on without any warning whatever. Sometimes they are preceded by loss of vision; the patient complains that it looks dark, though it be at mid-day, and beneath a cloudless sky. The pulse is generally excited before an attack. But during the coma, without the convulsive struggles, it is full and slow, constituting what is known as an oppressed pulse.

2. *The Prognosis*, though generally unfavorable, is influenced a great deal by the circumstances of the attack, the extent of organic injury the brain may endure, etc.

If the attack comes on early in the labor, with a contracted and rigid os uteri, the prognosis is more unfavorable than where it is delayed until near the close, and when the os uteri is dilated and soft.

The danger is in reverse ratio to the facility with which the delivery can be effected. Where the coma, insensibility and stertor are deep and continuous, and unattended with a repetition of the convulsions, and the limbs motionless, the danger is greater than where the latter obtains, because the case is more decidedly apoplexy, and most probably attended with an effusion of blood in the ventricles, or extravasation in the substance of the brain.

According to Cazeaux, the presence of albuminuria enhances the danger of those convulsions, even to a greater extent than œdema, and œdema without albuminuria, adds to the danger, as compared with those cases without it. Thus, four cases observed by M. Blot, with infiltration, three died; while three other, affected the same way, but without œdema, all recovered. MM. Blot, Regnault and Devilliers have reported fifteen cases with albuminuria, without œdema, of which seven died; and out of fifty-one cases

with oedema, and without albuminuria, eleven died. Of thirty-six cases with albuminuria given by Braun, twelve died, three of whom from complications.

Prof. Simpson reports five cases of puerperal convulsions connected with albuminuria, of which four died, and one made a speedy and perfect recovery. In one of the fatal cases, there was Bright's disease of the kidneys, fully developed.

Madame La Chapell states that one-half of the women who have puerperal convulsions die. While this estimate may be correct in regard to hospital cases, it is certainly overdrawn with respect to private practice. When cases receive prompt attention at first, and are properly treated, the proportion of mortality is very much less than one-half in private practice.

In delicate, nervous, hysterical women, the apoplectic form very seldom occurs; hence, they are more apt to recover.

Cazeaux observes that, when the convulsions come on in the last stages of labor, and continue after the delivery, the woman generally dies. This statement does not accord with our own experience, though it is limited; two such cases have come under our observation, both of which recovered; one was of extreme severity, the fits continuing at short intervals for several weeks after delivery, always leaving her comatose for several hours after; the intervals between the fits gradually became longer and longer, and the fits lighter and lighter, and after three or four years, she ceased having them altogether, at which time her health began to improve, and she became quite stout.

It is the opinion of some authors, that puerperal convulsions are generally fatal to the foetus; statistics show that a good proportion are born alive. Merriman reports fifty-one cases of convulsions, complicating parturition. Of these, thirty-four children were still-born, and seventeen born alive, making $33\frac{1}{3}$ per cent. saved. No doubt this is near the average proportion of lost and saved infants born under such circumstances.

3. *The Effects of Convulsions.* The effects of convulsions of the apoplectic form, depend in a great measure upon the violence and duration of the attack. The fits last from five to ten or fifteen minutes, and sometimes one convolution will continue for an hour, or half a day, and they have been known to last continuously for twenty-four hours. The coma and insensibility generally, or, in fact, always, last much longer than the struggle. When the convolution continues twenty-four hours, the coma may last several days. Such cases are recorded which have terminated in a prompt and perfect restoration to health; but, unfortunately, such favorable terminations are not always met with. Sometimes there is only a temporary suspension of some one or more of the functions, as the sight, hearing, speech motions, etc. At other times, such

lesions may be more permanent, or even life-long. We once knew of a case where the intellect and physical strength suffered to such an extent as to render the woman almost entirely an imbecile, and continued so during life, which was prolonged for several years after. A case came under our own observation, in which the coma continued for more than a week, during which the right side was stricken with complete paraplegia, involving the intercostal muscles, and the right side of the diaphragm, causing respiration to be performed by the left lung entirely, which was accomplished with the greatest difficulty, and accompanied with a loud and most distressing stertor. Speech was entirely destroyed, and the recollection of all past events banished. When the coma passed off, her condition, mentally and physically, was analogous to that of a newborn infant.

The paralysis of the respiratory muscles was promptly relieved by a large fly-blister, covering the entire right side of the chest, extending from the sternum to the spine, and from the clavicle to the last rib. Though a good reader before the accident, afterwards she had lost all knowledge of the alphabet, and had to be taught it over again, as well as to talk. Her capacity for reacquiring knowledge was not entirely destroyed; after a few lessons in the alphabet, a partial recollection of the letters seemed to return, which enabled her to relearn very rapidly, and in a few weeks she was again able to read, but indifferently; she never acquired her original proficiency in the art.

Before the attack she was a first-class speller, but never attempted to spell afterwards. Her mind, which was at first prostrated to almost idiotic imbecility, gradually improved until she was able to superintend her domestic affairs, with satisfaction to herself and family, and she did not appear to a marked disadvantage in society; but she never regained the brilliancy of intellect for which she was admired before her sickness. Her speech was never perfectly restored; she would often be at a loss to find a word she needed, and would sometimes misapply words, and some she could never pronounce. This defect continued as long as she lived, which was over thirty years after this accouchment.

The right leg was entirely paralyzed; but by friction and passive movements, muscular motion was so far restored as to warrant an attempt to learn her to walk, though as yet she possessed but very little voluntary control over it; but by repeated efforts, which were persistently continued for two or three months, she became able to walk a few steps without assistance, and in course of time recovered the almost perfect use of the limb. The arm on the same side was, if possible, more deadly paralyzed than the leg. She was no more conscious of its presence than though it had been a stick of wood hanging at her side, that is, so far as

sensation or voluntary motion were concerned. She would always lose it in bed, and require the assistance of the nurse, or the other hand, to find it for her; but by friction and passive movements at first, animation was so far restored in it that she could render it slightly amenable to volition; the improvement was very slow, but finally it was so far restored as to be useful, in handling larger objects; she learned to sew with her left hand, and could hold her work with the right, but could never control the motions of the fingers, so that she could handle a needle. The degree of recovery that was attained, after all the vital functions had been so thoroughly wrecked, by this Protean malady, is almost incredible; but it affords a forcible illustration of what may be accomplished by the persevering application of the resources of our science, even where an intelligent hope can scarcely be entertained of success.

Prof. Simpson has reported several cases of amaurosis, as the result of the apoplectic form of puerperal convulsions, connected with albuminuria; in some of which it passed off immediately after delivery, while in others it continued for a longer time, and in others again, the sight was permanently injured.

4. *Post-mortem Appearances.* Notwithstanding the assurance with which some authors speak of cerebral congestion as being the cause of this form of convulsions, post-mortem investigations afford but little proof of such a position; for it, as Cazeaux observes, "most usually leaves no appreciable anatomical lesion behind. Often, indeed, there is a little serosity found in the ventricles or arachnoid cavity, and possibly a more or less evident congestion of the encephalic vessels; and when the affection has terminated in apoplexy, the dissection has exhibited either an apoplectic extravasation into the cerebral substance, or else a free effusion on its surface. *But these are evidently nothing more than secondary lesions, the effects, and not the cause, of the convulsions.*" Great stress is now being laid upon the pressure of albuminuria in puerperal convulsions, as its cause. The post-mortem appearance of the kidneys shows a very frequent coexistence of Bright's disease in an incipient or advanced state—in many instances where the unassisted eye has failed to detect its presence, the microscope has revealed it. The search for the morbid condition should be prosecuted with great care, lest the important fact should be overlooked. A contrariety of results has arisen from a want of precision in making the examinations. The presence of albumen in the urine, where the kidneys were in an apparently healthy state, has led to closer observations, and the employment of the microscope, in searching for the cause of it. A modification of the function of the kidneys, by congestion of the organs, is now known to produce albuminuria, where not a vestige of the vesicular state can be detected even by the aid of the microscope.

The Germans have explained the peculiar state of the blood, in cases of albuminuria, as being caused by the abstraction of a large portion of its albumen, rather than being wholly poisoned by the mixture of uneliminated urea with it. This state of the blood they denominate *uræmia*.

5. *Treatment, where the Os Uteri is dilated or dilatable.* The treatment must be governed almost entirely by the state of the labor, and the condition of the os uteri. If the labor be sufficiently advanced, and the os uteri fully dilated or dilatable, upon the incursion of the convulsions, the forceps should be applied at once and the delivery effected. If the head be yet above the superior strait, and the os in a proper condition for delivery, whether the membranes are ruptured or not, the hand should be introduced, and the labor terminated by turning. If however the waters have been long drained off, and the uterus be contracting hard upon the body of the foetus, and the head be advancing but slowly, and from its position and the condition of the uterus, the introduction of the hand be impracticable, the delivery by the forceps must be effected from the superior strait.

The violence of the convulsions, the effects they have produced, and the danger they threaten, should be duly weighed, before any interference be resorted to, either by the forceps or turning. If the head be near its expulsion; with the occiput under the arch of the pubis, and the vertex at the vulva; the perineum distended; and the expulsion pains regular and efficient; and the convulsions only commencing with the expulsive stage, be slight, and far apart, with perfect consciousness between them; the labor, if progressing normally, might be safely left to the powers of the organism. But if the convulsions commence while the head remains above the superior strait, or even if it occupy the pelvic cavity, and be severe and protracted, with the intervals short and the coma complete, and the pains either hard or otherwise, but inefficient, delivery by artificial means is imperatively demanded, as affording the only promise of safety to either mother or child.

If it be a face presentation, with the head occupying the cavity, and the character of the convulsions be such as require immediate delivery, the forceps must be applied, and the labor terminated as though it were a vertex presentation. If it be a face presentation and the head above the superior strait, pelvic version, or turning must be performed. If, however, the position of the head in the strait, and the condition of the uterus render this impracticable, an attempt must be made to deliver by the forceps from the upper strait.

In case of a pelvic presentation, with convulsions, and the necessity for speedy delivery be apparent, it is a better practice to assist the descent of the foetus, by applying the blunt hook in the groin,

and by sufficient traction, bring it down, than by bringing down the feet. Should a transverse presentation be complicated with convulsions, turning, and delivering by the feet, promises the easiest and most speedy means of emptying the uterus, and securing the safety of the woman; the child could hardly be expected to survive such an untoward complication.

The accoucheur must exercise his own judgment in regard to the employment of anaesthetic inhalations, either in view of controlling the convulsions, keeping the patient quiet, while he performs his manipulations, or relaxing the parts so as to enable him to operate with greater facility.

When the coma is deep and continuous, with no, or but widely distant convulsive struggles, anaesthetics can be of no use, but on the contrary, they may be detrimental to the patient, and even enhance the danger of her situation. But when there is partial or complete consciousness between the convulsions, and when they come on at shorter intervals, and when the patient is restless and distressed, tossing herself about, from side to side, and the difficulty of keeping her quiet cannot be surmounted, and the parts require further relaxation, to secure a certainty of success in the proposed effort to relieve her, we regard the action of a proper anaesthetic agent as indispensable, and never hesitate to extend to her the benefit of its salutary and saving power.

When the Os Uteri is undilated and rigid. When this condition of the os uteri obtains, we are deprived of the advantage, derived from speedily evacuating the uterus, but must have recourse to other means of relief. Here we have presented two indications which cover the whole ground of practice. The first is to control the convulsions; the second is to facilitate the dilatation of the os uteri. Several of the means employed to affect the first, are serviceable in accomplishing the second.

First, when we have evidence, from the undue size of the abdomen, and the presence of oedema, and dropsical infiltration, that there is an excessive quantity of liquor amnii in the uterus, and the os uteri is sufficiently dilated to allow of the introduction of the finger; the membranes should be ruptured and the waters be permitted to escape. This excessive accumulation may from the inordinate distention occasioned by it, be the exciting cause of the convulsions, and as soon as it is evacuated, the fits may subside, and give no further trouble. The liquor amnii coming in direct contact with the rigid os, may cause it to relax and dilate, as it is known to do so frequently. Thus by this simple act both these indications may be answered, and the labor proceed to its normal terminations without further interference.

Where such evidences of excessive distention are not apparent, the rupturing of the membranes may not be followed by such bene-

ficial results; but, on the contrary, may further complicate the labor. It would be better, therefore, to allow them to remain entire, until the condition of the os uteri would justify such interposition.

With a view of controlling the convulsions, and at the same time relaxing the os uteri, blood-letting has, from time immemorial, been considered the "sheet-anchor" in the management of those pertaining to the puerperal state.

Dr. Dewees reports a case of epileptic convulsions, *primipara*, which occurred between the seventh and eighth month: os uteri slightly opened and rigid, from which he took eighty-seven ounces of blood, by the lancet, and ten ounces by cups, within fifty hours; at the first bleeding he took thirty-five ounces. In twelve days after the commencement of the attack, she gave birth to a dead child, in a state of partial decomposition, and recovered. She had four children afterwards. During two of these pregnancies, she submitted to medical directions and escaped the convulsions; in the other two, she neglected this, and had them each time.

The same author gives eight cases of puerperal convulsions, six of whom recovered. All of these were bled extensively; one lost one hundred and twenty ounces, in the space of six or seven hours. The first bleeding in this case was from the jugular vein, from which three pints of blood were taken. In another case, two quarts were taken at the first bleeding from the left jugular vein. Two of them recovered, with impaired vision. Three of them were *primipara*, and one with her second child. What the others were, we have no report. Four of the women were delivered of single living children, one of twins, one of which was living. Two deliveries were effected by the forceps, and two by turning.

Two of the eight cases died; these were, originally, under the care of other physicians; one was not bled, but had two doses of laudanum administered, of sixty drops each; she died undelivered. The other was bled largely, and was delivered by the forceps. The convulsions continued, after delivery, for about two hours, when she died. Whether the child was living or not, we are not informed.

The success attending this practice far exceeds the statement of Madame La Chapell, who avers that one-half the women afflicted with it are lost.

Whatever may be said for or against this sanguinary practice, the facts, as above stated, remain unaltered. Any course of treatment by which three-fourths of the subjects of this formidable malady can be saved, is not to be despised. If, however, a plan can be suggested by which as great, or greater results, can be attained, with more promptness, and without so lavish an expenditure of the blood, it should receive the consideration to which it is

justly entitled, without regard to the opinions or doings of the past. Before the ligature was applied to the severed artery, by Ambrose Paré, blood was stopped by the application of the red-hot singing iron and boiling pitch, to the open mouths of the divided vessels, and lives were saved; but the new plan was an innovation upon the old one, and the innovator was condemned and spurned by his cotemporaries for his temerity in hanging human life upon a thread. But the neatness, safety and freedom from torture that were combined in the new plan, soon secured for it such an amount of public favor, that it entirely supplanted the old time-honored relic of barbarism.

If the nervous irritation can be allayed, and the action of the heart and arteries controlled, and the encephalic capillaries disgorged as effectually and more promptly, by other means than blood-letting, no predilections in favor of past usages, nor considerations for authorities, should be allowed to interfere with the adoption of the new measure.

As the apoplectic form of puerperal convulsions is only a graver phase of the epileptic form, the course of treatment indicated in the latter is also applicable to the former, only requiring, perhaps, a corresponding boldness or fearlessness in the exhibition of the appropriate agencies. The lobelia inflata in tincture, stands most prominently among the agencies capable of controlling convulsive actions, and here its use is more especially indicated, not only as a means of quieting nervous irritation, subduing the excitement of the medulla oblongata, which power it possesses in a preëminent degree, and of restraining the action of the heart and arteries, all of which it is capable of doing by virtue of its all-controlling sedative properties, with greater promptness and efficiency, than venesection is capable of doing, but as one of the most certain and effectual means of unlocking the uterus, by relaxing its contracted and rigid mouth.

The vinous tincture of lobelia, given in double the quantity that may be required of the alcoholic preparation, is often preferable to that article, on account of the absence of the oil of the plant contained in the latter, and to which many of its unpleasant and alleged dangerous effects are due. The main cause of failure, in overcoming these convulsions by the use of the lobelia, consists of a want of the necessary quantity being administered. The greatest danger in giving lobelia, is in giving it too sparingly. The vinous tincture may be given in doses of from one to two ounces, according to the urgency of the case and the severity of the fits, and repeated every half hour or hour, until the pulse is reduced in force and frequency, the nervous agitation is tranquilized, and the convulsions are subdued. If, from the condition of the patient the medicine cannot be taken by the mouth, twice the quantity mixed

in half a pint of warm water; or, which is better, half a pint of a strong infusion of the herb, thrown well up into the rectum, and repeated as often as may be necessary, at intervals of from fifteen to twenty minutes, generally has as good an effect, if not better, than when it is taken by the mouth.

A drop or two of the tinct. verat. viride, given in combination with each dose of the lobelia, promotes its sedative action upon the heart and arteries, and consequently reduces the force and frequency of the circulation. After this has been accomplished it must be maintained, by the exhibition of three or four drops of the tinct. of aconite leaves, every two or three hours.

As albuminuria is a frequent complication of puerperal convulsions, and probably often the cause of the malady, yet it cannot be conceded that it always results from the vesicular degeneration of the kidneys, or Bright's disease, but the albuminous urine is caused by a congested state of the organs.

The following views expressed by Prof. Buckman, and extracted from an article, on albuminuria, written by him, accord so entirely with our opinions, that we give them in his own words:

"The appearance of albumen in the urine, long since regarded as diagnostic of Bright's disease has been by the experiments of Robison, Frerichs, Hermann, Overbeck, Bowman, and others, demonstrated to be the evidence of renal congestion, of which granular degeneration is but the natural result.

A congestion maintained for two hours by ligation of the emarginate vein invariably is followed by this albuminous deposit; still more certainly does it follow when the pressure is sustained by disease of the heart where the vena cavae is not properly emptied, and its contents forced back, causing congestions of all the glands and organs below, nor is the effect at all different where the pressure is produced by a gravid uterus, aneurisms, enlargements of the liver, by disease or from any other cause producing an interruption of the proper circulation in this organ; various medicines that irritate these organs, such as cantharides, turpentine, &c., are frequently known to produce the same result.

Regarding the ganglionic nerve centres as the controlling agencies of nutrition, involving not only health but disease, as these are alike governed by the law of nutrition, it will be profitable as a means of arriving at the most efficient mode of treatment to consider the progress of the disease from the renal ganglia; it will be apparent that when these are debilitated from the want of a sufficient nutrient supply of blood, are in a condition of anaemia—that they are incapable of supplying sufficient nerve power to either control the blood supply to the kidneys, or to maintain their proper function to a healthy standard, consequently the relaxed condition of the artery from the deficiency of the nerve power in controlling

it, permits a large excess of blood to flow into the kidney, whence there is an increase of nutrition tending to develop all of the textures of the structure to an increased magnitude, until a change of structure is accomplished, which may continue until there has been such a change in the substance of the organ as to disable it from resuming its functions, when granular degeneration results. The same ganglionic anaemia that disable the arteries from controlling the influx to kidneys, also incapacitate the veins from relieving the engorgement, whence the congestion continues unabated or rather aggravated, and the distention increases; blood and serum, transude the vessels, and appear in the urine; while at the same time the same ganglionic anaemia disables the gland from performing its proper functions, and less urea is organized from the blood, while the serum and blood appear among the secretions as albumen and blood corpuscles, indicating a loss of function in the gland, which may progress to degeneration, and result in the death of the patient.

"This philosophy calls for a line of treatment differing from that generally in vogue with the profession; counter-irritations by blisters, induce albuminuria rather than relieve it; cupping, bleeding, etc., tend to deprave the blood, which is sometimes a cause of the condition referred to; the milder diuretics, as buchu and parsley may be employed; but no remedy has been found to be of such immediate advantage as that proposed by Dr. J. Chapman, of London, consisting of dry heat applied along the spine, over the region of the kidneys, which, acting by its stimulus upon the nerve centres, promotes an increase of action and function, with an abatement of the symptom, when appropriate measures, as the use of tonics, nutrients, etc., must be resorted to, to maintain the proper equilibrium between function and nutrition in order to preserve the restored healthy condition." During the convulsions of parturition, where the albuminuria is detected simultaneously with them, or even some time antecedently; dry heat over the kidneys, as an adjuvant in shortening their duration, should by no means be neglected.

While the foregoing treatment is progressing, the condition of the head should not be overlooked; should it be hot, the face swollen and livid, and the eyes red and their vessels injected, the free use of ice water, or pounded ice in a bladder, or India-rubber pouch, should not be neglected. By this means of refrigeration, coöperating with the subduing action of the lobelia and veratrum, the cerebral congestion is overcome and ventricular effusion or extravasation prevented. If, however, either of these accidents shall have occurred, before the application of our remedies, our efforts will prove ineffectual, let them be what they may. In those cases of deep coma and profound insensibility, with motionless limbs, and an absence of recurring convulsions, the strong probability is that there are effusions in the ventricles, or extravasation in the sub-

stance of the brain or between the meninges, either of which would render the case hopeless; though cases are recorded where the remains of a clot have been found, many years after the cause that produced it had become extinct.

The second indication, is to facilitate the dilatation of the os uteri. Where the convulsions continue, despite our efforts to control them, and the os uteri remain closed and rigid, another expedient is left, to which we must have recourse, and that is to attempt its relaxation and dilatation by the use of topical agencies. For this purpose belladonna ointment, or what is considered better by some authors, the extract of belladonna should be smeared, with considerable freedom, upon the internal and external surfaces of the os; this will, in most instances, cause it to relax in a very short time. We not long since produced this effect in a case of extreme rigidity in five minutes time, by the application of a little belladonna ointment, made impromptu by rubbing up a few drops of the tincture with a little simple cerate, both of which happened to be at hand. The effect was almost miraculous, in overcoming a rigidity that had withstood the actions of the uterus for seventy-two hours. Chloroform mixed with simple cerate or lard, in the same manner, is said to produce a similar result with equal promptness. Opium ointment is used by some for the same purpose, but it is inferior to the belladonna.

Should these relaxing agencies fail in producing the effect desired, from the spasmodic character of the contraction or the presence of a fibrous or scirrhous tumor at the os, and the convulsions continue unabated, we have either to leave the patient to the mercy of her malady, or make choice between two expedients yet left for our resort. One is to enter the uterus and deliver by force, and the other to incise the os uteri, and in that manner overcome the resistance. The first is impracticable, and can never be attempted, except at great risk of adding to the complications already existing; in case of convulsions, the irritation and suffering that would necessarily result from such a manœuvre, would tend greatly to enhance the severity of the disorder; besides, even if she were put under the influence of an anaesthetic, to prevent suffering, the force that would be essential to overcome the physiological action of the os, would greatly endanger or absolutely produce a laceration of the part. Again, such a forced dilatation, with the continuous disposition and tendency to contraction, would so bind upon the hand or instrument introduced, as to render such introduction useless, for want of room to act. Where there is a minor degree of resistance only to be overcome, and where the structures manifest a disposition to yield to force applied, a moderate amount may be employed, and an attempt made to deplete the uterus, either by turning, or the forceps, whichever may be found to be the most practical and promise the most speedy relief.

The operation of incising the os, is a very simple and comparatively harmless one. It consists in making a clear incision through the resisting structures of the os, in four or five places, or as many as may be necessary to attain the object in view. It is attended with but very little pain or hemorrhage, and readily heals. This expedient is objected to by some authors, on account of the laceration that is alleged to follow the incisions, as the head of the foetus passes through the mutilated part. This objection rests upon a theoretical, and not upon a practical basis; as those who have had recourse to the expedient aver that very little or no laceration follows its adoption. The operation, however, should not be resorted to upon trivial occasions, or with a view of overcoming minor difficulties. It is never justifiable to employ cutting instruments in reference to either mother or foetus, except when the life of one or the other or both is in jeopardy, nor then, without the advice and counsel of an older or more experienced practitioner.

In managing a case of puerperal convulsions, the object of the accoucheur should be to arrest them as soon as possible; for the longer they remain before delivery, the more apt they are to continue afterwards, and such are regarded, generally, as more fatal than those that terminate with the birth of the child. By bearing this in mind, the necessity of endeavoring to relax and dilate the os uteri, at the same time efforts are being made to subdue the fits, becomes apparent; for it very often occurs that the latter is attained, before there is any appearance of being successful in regard to the former. It should be remembered that the most successful way of overcoming the convulsions, is to empty the uterus. As soon, therefore, as the os uteri is sufficiently dilated, or dilatable, the delivery should be effected, either by turning, or by the forceps, as may appear the most feasible, unless the labor be progressing so favorably, as to justify waiting for its spontaneous termination. After the delivery, the case must be conducted as though it were an eutocial labor. Should the convulsions continue, they must be treated as above directed, and as though delivery had not taken place.

SECTION III.—HERNIA, WITH OR WITHOUT PROCIDENTIA.

Hernia implies the displacement of any viscous or part of a viscous from its natural cavity, by some operation; in which case, it presents externally, in the form of a tumor, or enlargement, at the point of its escape. The abdomen is more liable to these hernial protrusions than any of the other cavities. It gives rise to inguinal hernia, which consists of a portion of the intestine or epiploon passing out through the inguinal canal; to crural or

femoral hernia, where the issue is by the crural canal; to umbilical hernia, which occurs at the umbilicus. There are also other varieties of hernia which occur at the different openings from the abdominal cavity, as well as those where portions of the viscera protrude through parts that are imperforate, as epigastric hernia, where the protrusion takes place through the linea alba above the umbilicus, and hypogastric hernia, where it occurs through the linea alba below the umbilicus, etc.

Where there is any procidentia of hernia, which is reducible, the first effort should be to reduce the protruding matter, and retain it in its natural position by making and continuing pressure upon the point of protrusion by the hand, or one or two fingers, during the remainder of the labor. This pressure must be made by a trustworthy assistant, the woman herself cannot be entrusted with so important a charge, while she is enduring the pains and struggles of parturition, and the accoucheur himself has other duties to perform, during the process. The woman should be enjoined not to bear down, or aid herself by the contraction of abdominal muscles, more than she can avoid, as this effort favors the reëscape of the visceral portion. Should it be irreducible, the tumor should be supported by as firm and steady a pressure by the hand as can be comfortably borne, especially during the pains. This to prevent the further escape of the protruding mass, and also to prevent strangulation. Should the symptoms of strangulated hernia become apparent, the delivery must be effected as speedily, as the state of the os uteri will permit, either by turning or the forceps, as the case may indicate; and then if the symptoms of strangulation do not disappear the case must be treated according to the principles of surgery in such cases directed.

If there should be no procidentia at the commencement of the labor, the hernal opening should be pressed upon, either by the hand or fingers, as the case may require, during the remaining stages of labor, with a view of preventing its protruding; and the labor should be allowed to progress, without the voluntary assistance of the woman.

SECTION IV.—SUDDEN ATTACK OF ACUTE DISEASE.

It may occur that the woman may be attacked suddenly with some acute disease at the time of labor; or be taken in labor during such an attack, as a local inflammation of one or more of the vital organs; or some violent nervous effection, as gastrodynia, neuralgia of the brain, head, etc., which may complicate the labor, and render it one of dystocia, calling for the interference of art. Where the character of the attack is such, that will admit of an attempt to mitigate its violence, while the process is progressing, this should

not be neglected, but the appropriate means of relief be promptly administered. But where such a course is not practicable, the complication should be terminated as speedily as possible, if the os uteri be dilated or dilatable, by artificial delivery, either by turning, or the forceps, or may be indicated by the position of the head. Should it be other than a vertex presentation, the appropriate means of depleting the uterus should be promptly invoked.

Asthma, syncope exhaustion, inertia, laceration of the uterus, etc., may so far complicate an otherwise eutocial labor, as to convert it into a dystocial one, requiring the assistance of art, to insure it a safe and speedy termination. These various complications will be considered singly, and the appropriate course to be pursued in each one, indicated.

1. *Asthma.* A severe asthmatic paroxysm is exceedingly distressing under the most favorable circumstances of life, but when it attacks a woman in labor, at a time above all others, when the unobstructed use of her respiratory organs are so essential to her comfort, and to the continuance of her existence, it becomes insupportable, and death from asphyxia may be the result. This complication is most likely to occur in women who are subject to attacks of spasmodic asthma.

Should an attack of asthma come on during labor, and by its severity threaten the safety of the patient, if the os uteri and other soft parts be favorably disposed, the labor should be terminated at once, as in the other cases. If labor should come on during an attack of asthma, and the os uteri remain closed and rigid, it should not be interfered with, but the whole attention should be directed to the relief of the patient, by subduing the urgency of the symptoms. For this purpose the vinous tincture of lobelia inflata, in two drachm doses, combined or not, as may agree with the judgment of the practitioner, with ten drops of the acetic tincture of sanguinaria canadensis, should be given every fifteen or twenty minutes. A powerful nervous sedative, that often displays great promptness in relieving spasmodic asthma, is the hydrocyanic acid in two or three drop doses, given every two hours. Dr. Painc says the ethereal tincture of lobelia, by inhalation, will relieve the breathing in a very short time, though in a very few instances, he has been obliged to continue it until nausea and vomiting ensued. Very often asthmatic patients have some favorite remedy always on hand, to which their experience warrants them in resorting, upon the incursion of the paroxysm, and with which they are generally successful in cutting it short. These should not be despised by the practitioner, but anything, however simple or empirical it may appear, that experience has proved to be beneficial, in alleviating the suffering, should be embraced upon such occasions as this. If the paroxysm can be broken and the

normal respiration restored, the labor may be allowed to progress to a spontaneous termination; but if not, and the os uteri be found to have yielded to the relaxing effects of the lobelia, or to the contractions of the uterus, and become sufficiently dilated or dilatable to justify interfering, the labor should be terminated artificially, as in the former instance.

2. *Syncope.* Syncope has long been regarded as a very serious complication of labor, requiring the utmost vigilance on the part of the accoucheur, and often calling for the most prompt and decisive action.

The cause of Syncope. That particular form of syncope that is connected with, and complicates labor, is not the result of extreme physical debility, but is due to a peculiar irritability or morbidly sensitive condition of the nervous system. A different variety of syncope, even more to be dreaded than the foregoing, may arise from hemorrhage. Dr. Dewees says, that "an internal hemorrhage is perhaps the most frequent cause of this alarming condition."

Baudelocque relates a case of syncope from a very large calculus in the gall bladder.

A variety of miscellaneous causes may exist, to which individual cases of syncope can be referred, but it is most generally attributable to a constitutional idiosyncrasy that manifests its peculiarity more especially during labor than at any other time.

Diagnosis. In those cases where syncope follows each labor-pain, or where it is only broken by the recurrence of the pains, where the progress of the labor is not interrupted by the condition of the system attendant upon it, where the pulse remains unaltered, and the countenance retains nearly or quite its usual appearance, the fainting may be regarded as the result of constitutional causes. Where it occurs successively, in different labors, it may also be referred to constitutional causes.

Where there is excessive hemorrhage, and accompanying syncope, attended with the usual symptoms of excessive loss of blood, the diagnosis is sufficiently well-marked to prevent any mistake in regard to it.

Where faintings occur, presenting other characteristics than those resulting from peculiarities of constitution, such as gradually increasing exhaustion; where the process of labor is modified, by the pains decreasing in force and frequency; where the syncope becomes more permanent, and the intervals between the paroxysms of shorter duration; where the pulse becomes diminished or nearly extinct, and the extremities get cold, with no visible hemorrhage to account for such conditions: underlying these phenomena is a concealed cause, which must be discovered, without delay, and removed, or the patient will be lost. Internal hemorrhage, either

in the uterus, or one of the other large cavities, may be more than suspected.

Prognosis. Where the syncope can be fairly referred to a pre-existing idiosyncrasy; where the labor proceeds uninterrupted; where there are no untoward constitutional symptoms, nor increasing exhaustion, the danger is not imminent, and the labor may be allowed to proceed without interference, until a degree of exhaustion, of an alarming character, supervenes.

Where the syncope is caused by hemorrhage, either unavoidable or accidental, the case is attended with peril, unless it can be readily restrained, or the complication terminated by delivery.

Where the syncope can be referred to neither constitutional peculiarities nor visible hemorrhage, the danger is in proportion to the obscurity of the cause, especially where the exhaustion is great, and increasing, and the constitutional symptoms indicate the waning of the vital forces.

Treatment. Where the syncope is attributable to idiosyncrasy, and unattended by exhaustion, or other unfavorable symptoms, and the labor is progressing otherwise normally, the system may be supported by some nervous stimulus, as carb. ammon. wine whey, or some of the antispasmodics, a few spoonfuls of good wine, or broth, either taken by the mouth or per rectum or some light food. If the os uteri be uninclined to yield, a little belladonna ointment may be applied to it, to facilitate its dilatation, and the labor may further be left to the efforts of the organism. But if exhaustion should supervene, the pulse flag, and the countenance appear pinched and contracted, with the os uteri favorably disposed, there should be no time lost in effecting delivery.

Where syncope is accompanied with hemorrhage; or where the symptoms are urgent, without visible hemorrhage, the labor should be terminated, as soon as the state of the os uteri will permit, by artificial means. Any attempt at relieving the symptoms, by general treatment, would be unjustifiable and dangerous, as there is no time to lose, in such unprofitable endeavors.

3. *Exhaustion*, like syncope, when manifested during labor depends more upon some peculiarity of the nervous system, than upon mere bodily weakness; this peculiarity consists mainly, if not wholly, in a deficiency of that stamina of the constitution that enables persons to endure hardships, toil and suffering. This species of exhaustion is not an absolute loss of strength, as it appears to be, from muscular relaxation, but a prostration of nervous force, or a surrender of the general power of endurance, to the demands of the uterus, which requires extraordinary strength to enable it to perform its laborious

mission. Every experienced accoucheur can bear testimony to the fact, that the most delicate woman, and those who are even far gone in phthisis, and other debilitating disorders, bear the pangs of parturition, with the most heroic bravery, and astonishing endurance; while those apparently stout and able-bodied, yield early to a degree of exhaustion, and amount of despair, wholly disproportionate to their apparent capacity of endurance. Whatever may be the extent of exhaustion, it is seldom attended with syncope, except where it is accompanied with inertia of the uterus, which complication sometimes exists, but they are generally separate and distinct conditions. It is analogous to syncope, in so far as its greatest manifestation is observed during the intervals between the pains, which are not often remarkable for their severity or duration. But as each pain passes off she sinks into a state of helpless exhaustion and despair, in which she continues until she is aroused from it by the succeeding pain. The strength is temporarily restored during the presence of the pains, upon which it appears to be all expended, and she again relapses into her former state of helplessness and exhaustion. As the labor progresses these relapses become more and more intense, until they excite alarm for her safety. Where, during the exhaustion the pulse is slow, but retains a considerable volume, it is evidently due to a prostration of the nervous system, upon which stimulants and restoratives have but little effect. A similar condition, without syncope, is sometimes induced by flooding, which is improved by stimulants. The os uteri generally yields readily, under this condition of the system, and is, in due time, favorable to artificial delivery, which should be resorted to, when the exhaustion threatens the safety of the patient. Turning or the forceps, may either be employed as the state of the labor or condition of the parts may indicate.

4. *Inertia of the Uterus.* This is when the normal vigor of the uterus is impaired or entirely suspended, resulting in a corresponding diminution or arrest of the contraction, and consequent decline in, or utter cessation of, the process of labor. This condition may arise from a variety of causes, as first from over distension, occasioned by an excess of liquor amnii by which the uterine fibres, from extreme tension are enfeebled, and their contractility weakened or destroyed. Secondly, it may arise from hyperæmia of the uterus, presenting all the phenomena of genuine inertia, or absolute want of strength. Thirdly, there is, what Dr. Dewees denominates a passive state of the uterus, which constitutes another variety of inertia. Fourthly, perhaps the most frequent variety encountered in practice, is that positive inertia induced by long continued and severe exertion, which is a state of exhaustion from being over-worked.

Symptoms. In the first variety, the pains recur at rather un-

certain intervals, and are confined almost entirely to the uterus alone; there is but very little of that bearing down, or forcing sensation, that is present in the regular and normal actions of the organ. The membranes are not so tense, when presented at the os uteri, during the pains, as in a healthy labor, at the same stage. There is an unusual restlessness and anxiety manifested upon the abatement of the pains. This is liable to be mistaken for real *weakness*, but it is not really so, for stimulants, instead of relieving it, only augment the difficulty, by stimulating the system, and exciting the uterine fibres to more frequent but less efficient action.

The second may be known by the labor presenting the usual appearance of success, at its commencement, but gradually the powers of the uterus, are observed to decline; the os uteri shows a disposition to dilate, but the presenting part fails to protrude during pain; the pains are not confined to the uterus, as in the former variety, but are felt all through the abdomen. The patient complains of a sensation of suffocation and sinking, the pulse is full and hard, or depressed, and the pains irregular in frequency and force.

In the third variety the labor commences in the usual way, the first stage is well marked the *show* is abundant; the regularity and efficiency of the pains, and the general character of the labor give promise of its speedy termination.

Instead of progressing, however, in this favorable course, the pains soon begin to subside rapidly, until they cease altogether, or nearly so, without any appreciative cause, and the efforts of labor appear to have come to a close. In such cases the pulse is but little altered, but symptoms of nervous disturbance supervene, as palpitation of the heart, oppression at the praecordia, with a sense of suffocation, upon lying down, and syncope upon sitting up. The os uteri is generally dilated or relaxed, and the membranes remain unruptured. This variety generally excites alarm, and is often improperly treated with general stimulants.

The fourth variety. Here the uterus commences to act with the usual rigor, and continues for a long time, without producing the usual favorable results, or its action may be extraordinarily severe, and continue a correspondingly shorter time. In either case the uterus ceases to contract, or contracts so feebly as not to advance the labor. Inertia from this cause is generally accompanied by a loss of bodily strength, in having been exhausted in voluntary efforts to assist the uterus in its fruitless endeavors to expel the fœtus. The patient is indisposed to exert herself any more than can be avoided; she sleeps between the slight pains that may continue. If they have ceased, the sleep, uneasy and restless, is prolonged until she is aroused by those in attendance. There is more or less perspiration, the pulse is frequent and small, the counten-

ance has a pale and haggard appearance, and there is often nausea and vomiting.

Very often in this variety, as well as in each of the others, except perhaps the first, a rigidity of the os uteri, organs, underlies all other causes; the os refusing to respond to the contractions of the body and fundus, the uterine fibres become exhausted from their ineffectual efforts to deplete the organ, and we have the symptom of inertia manifested, as above described. After the uterus has become inert, the os participating in the condition of the rest of the organ, relaxes, but the relaxation has come too late, the power of the body and fundus having become exhausted, it is of no avail, further than to favor an attempt at artificial delivery.

Treatment. In the first variety, where the inertia results from an excess of liquor amnii, the loss of power is only relative, and though it may have all the appearance of absolute weakness, and may be mistaken for it, yet it is not really so. The remedy in this case is to remove the cause, by rupturing the membranes and allowing the liquor amnii to escape. This should be followed by friction upon the abdomen, and titillation of the inner margin of the os uteri, as heretofore directed, with a view of exciting the motor action of the uterus, which can be generally accomplished in a short time, and manifested by an increase in the force and regularity of the pains.

The second variety, where the inertia results from an engorgement of the uterine vessels, or hyperæmia of the organ, Dr. Dewees says: "can only be relieved by blood-letting." If the diagnosis could be made with certainty, venesection would, undoubtedly, be the quickest, and, perhaps, the most effectual way of relieving the turgescence of the vessels, and, consequently, removing the cause of the difficulty; but, where there must, of necessity, be more or less uncertainty, and where the loss of blood would be attended with such disastrous consequences, in a case of true inertia, it cannot but be regarded as a very hazardous resort. The application of dry heat to the lower part of the spine and sacrum, by means of a bag filled with sand, as hot as can be borne, or an India-rubber hot-water bag, would be nearly as prompt, quite as effectual, and much less hazardous than blood-letting, because if there were a mistaken diagnosis, and injury be the result of the application, it would not be irreparable, as would be the case were it done by bleeding. Electro-galvanism, skillfully applied, would tend to relieve the turgescence, by stimulating the capillaries and causing their contraction. This should be done by placing the negative pole in a vessel of warm water, into which the feet of the patient should be immersed, and the positive pole held in the left hand of the operator, who, with the right hand, should make downward

passes over the entire abdomen or uterine tumor. This operation, continued for twenty minutes or half an hour, would be pretty certain of arousing the action of the uterus in a very satisfactory manner. This practice is pursued by some accoucheurs with marked success, and is worthy of more extensive application.

The third variety, which consists of a passive state of the uterus, is peculiarly adapted to the use of oxytoxic agents, or such as have a specific effect upon the uterine fibre. At the head of this class of remedies stands the secale cornutum, ergot or spurred rye. The discovery of the oxytoxic properties of this article, is probably due to Germany, where it has long been known by the significant title of "mutter korn," or womb grain. The caulophyllum thalictroides, or blue cohosh, is acquiring some reputation as an excitant of the uterine fibre. Prof. Simpson introduced the cannabis indica, or Indian hemp, into the practice of obstetrics as an oxytoxic. He says of it: "In the few cases of labor in which it was tried, parturient action seemed to be very markedly and directly increased after the exhibition of the hemp; but far more extensive and careful experiments would be required before a definite opinion could be arrived at relative to its possession of oxytoxic powers, and the amount of those powers." The gossippium herbaceum, or cotton plant, is said to possess some claims as an oxytoxic agent.

The former of these articles possesses a high reputation as an excitant of the uterine fibre; but its powers are very much more distinctly marked in promoting uterine contractions during labor, than in inducing them during the quiescence of the uterus. In the former instance, its action is prompt and energetic; on this account, it should be prescribed with due caution. When administered in full doses, while the head is above the superior strait, the violent action it induces is most likely to destroy the foetus during its passage through the straits of the pelvis, even if the os uteri be fully dilated; but, when given where the os is undilated, the danger is very much enhanced. It was recommended by Dr. Dewees, in substance, and in scruple doses. When the head has engaged in the inferior strait, after its rotation, should the uterus become inert, a scruple of powdered ergot might be given with safety; but in a less advanced state of the labor, especially in the first one, it had better be administered in divided doses, of five or six grains, every ten or fifteen minutes, until its action becomes apparent, when it should be discontinued, or given at such intervals as may be necessary to keep up the action, provided it should be found to decline. The ergot should never be given where there is a probability that turning will have to be resorted to, for the contractions induced will be a serious hindrance to the operation. Its use had, therefore, better be withheld until the head be found to occupy the pelvic cavity, after which, turning will be impracticable.

Where there is a deformity of the pelvis, a malposition of the foetus, or a rigid os uteri, its use is contra-indicated.

The fourth variety, or that inertia induced by over-exertion of the uterus, is a proper case for the employment of the ergot, or any other oxytocic agent that may be preferred, provided the os uteri and external organs are sufficiently relaxed, and the labor be far enough advanced, to warrant a speedy escape of the foetus. Valuable time is often wasted, in waiting for a spontaneous restoration of the uterine energy, or in the vain attempts to revive it by the use of general stimulants. Such a course is too often met by disappointment to entitle it to much confidence. Should the ergot fail to accomplish the desired result, and the parts be favorably disposed, the labor in this instance, as well as in the other varieties of inertia, where the remedies recommended fail, must be terminated by artificial means, either by turning, or the forceps, as the case may indicate.

Generally all cases of inertia of the uterus are treated alike, regardless of the cause producing it. Dr. Dewees was the first to make the foregoing distinctions, and to call the attention of the profession to their importance. He confounded exhaustion and inertia together and treated them under the head of exhaustion. This complicity renders the consideration of the two subjects obscure, and deprives both of that precision of detail, to which their importance entitle them. In examining these two subjects we have dealt freely with the views, and in some instances the language of this distinguished writer and teacher, in doing which we have been able to present them in as plain and comprehensible yet concise a manner as is consistent with their nature.

SECTION V.—RUPTURE OF THE UTERUS.

Of all the misfortunes that can befall the parturient woman, this is the most formidable and perilous, to both her and the unborn child. It has been known to occur at almost every stage of pregnancy, and has been attributed to a variety of causes, prominently amongst which is an abnormal condition of the uterine walls, as softening from the presence of an abscess, or ramollescence from some other cause. Its occurrence is very seldom in the early months of pregnancy, but more frequently after the fifth or sixth month; during labor, and in the expulsive stage, it most commonly happens. As our purpose is only to consider rupture of the uterus, in connection with labor, we shall dispense with it in every other relation, and confine our inquiries to it as a cause of dystocia.

In young women where the uterus is healthy and vigorous, we rarely meet with a case of rupture of the organ, but where the woman has borne several children, and the tone of the uterus be-

come impaired, it is less uncommon, and in those farther advanced in life, and who are the mothers of still more children, the accident is more frequently encountered. In seventy-five cases collected and reported by Churchill, it occurred with but nine in the first labors, fourteen in the second, thirteen in the third, and thirty-seven in the fourth and subsequent ones.

It has been observed that rupture of the uterus occurs more frequently in connection with male births, than female, which is no doubt owing to the fact, that male children are usually somewhat larger than female. We have elsewhere said that the labors with boys are generally more severe and protracted than with girls, and gave as a reason, the increased size of the former. As a rule the uterus gives way more frequently in severe labors, than easy ones; this accounts for ruptured uteri occurring more frequently with male than female births. Dr. McKcever reports twenty cases of ruptured uteri, of which fifteen were with boys; and Dr. Collins mentions thirty-four cases, of which twenty-three were with males.

The uterus is liable to rupture, either in the fundus, body, or neck, and either in the anterior or posterior walls, and the rent may be in any direction. The neck is more frequently subject to rupture, than the body, or fundus, and the sub-vaginal portion, or that part below the insertion of the vagina, is the most frequently lacerated, of any other part of the organ; indeed there are but few women who pass through the child-bearing period of life, without experiencing a laceration of the lips, or lower portion of the neck, to a greater or less extent. Every practitioner, experienced in the use of the speculum, has observed deep fissures in the os uteri, which are but the remains of some previous rupture. The accident, when it occurs here, is not generally of much account, as it heals readily, and leaves no evil consequences, further than a little deformity of the part, which admits of neither inconvenience nor discomfort.

The rupture may be complete or partial; it is complete when the rent extends through all the structures of the uterus, and there is an open aperture through the uterine walls, communicating the cavities of the uterus and abdomen with each other. A partial rupture is where either one of the structures, the mucous, muscular, or serous, may suffer. Sometimes only the mucous lining receives the injury, in which case it is of trifling import, as it soon heals after contraction. Again, the mucous membrane and muscular structure may be rent, and the serous remain unbroken; or the mucous and muscular remain entire, and the peritoneum be the seat of the injury. In any of these partial ruptures the accident is not so grave as when all the structures are involved at once. A laceration of either the muscular structure or peritoneum, is more serious than of the mucous membrane. The symptoms are always

milder, and the chance of recovery greater, where the rent does not involve the peritoneum, because the complications are less. In this case, the foetus does not pass into the abdomen, but is delivered *per vias naturalis*. Should the rupture extend through to the abdomen, the strong probability is that the membranes will break and discharge the liquor amnii into the abdominal cavity, provided they remain entire up to the time of the rupture. This may occur, though the rent be too small to permit the foetus to pass through it. This complication very seriously heightens the dangers, by enhancing the liability to peritoneal inflammation.

1. *Causes Producing Rupture of the Uterus.* Certain conditions of the uterus may act as predisposing causes, and to such an extent as to require but very slight exciting or determining ones, to accomplish the mischief; while, on the contrary, the exciting causes may be so powerful as to effect the rupture, though the state of the structures be perfectly normal, other remote causes, than a morbid state of the uterine structures, co-operating in the destructive work.

Among the remote or predisposing causes, may be enumerated, as pertaining to the uterus alone, scirrhous, fibrous and other tumors, a ramollescence of the uterine walls, from an abscess, or previous inflammation, a cicatrix from a previous rupture, or the Cæsarian operation, etc., or from the change that takes place in them from pregnancy, and an undue rigidity of the os. An irregularity in the thickness of the walls, and hence an irregularity in the contractions, causing an unequal distribution of the force, it being stronger and more decided in some parts than in others. The remote causes pertaining to the ovum are a superabundance of liquor amnii, or the presence of a plurality of fetuses, or any other circumstance that may induce excessive distention of the uterus and a corresponding thinness of the uterine walls.

La Motte, Levret, Crantz, and some others of the older, as well as some of the more modern writers, have given the foetal movements as a cause of rupture during parturition. Dewees regards these as "totally incompetent" because the foetus is almost always passive, during the stage of labor, in which the rupture occurs, and as additional proof of this incompetency he says the uterus has given way after the death of the child.

The unevenness of the foetal surface, from the projections of the folded-up limbs, is held by some as a cause of rupture, by being severely pressed upon during the contractions of the last stage of labor.

The causes producing rupture, disconnected with the uterus, are an undue contraction of the pelvis; fibrous, bony or other tumors in its cavity; an unusual sharpness of the pelvic brim, or any cir-

cumstance that tends to impede the descent of the head of the foetus. The violent contractions of the abdominal muscles, causing severe pressure upon the uterine globe, while it is in a state of powerful contraction, may contribute to the rupturing of the organ.

There is another set of causes, that partake rather of a traumatic character, that often play an important part in the production of ruptured uteri, for instance mechanical injuries, as falls, blows, kicks, violent pressure, etc., externally inflicted; and external violence, as awkwardness and want of skill in turning, an attempt to restore a protruding limb, or violence committed in endeavoring to use the forceps, etc. Those that may be externally applied, more frequently result in inflammation and its consequences, and in this way act indirectly as predisposing causes, rather than by their direct application, to produce the rupture. To these are added several other comparatively trivial circumstances that have been recorded as causes of ruptured uteri, which are incapable of producing that result, unless the organ be very seriously affected by disease, or suffering from the effects of some one or more of the foregoing causes.

The principal determining or exciting cause of rupture of the uterus, during labor, is contraction. The healthy organ has never been known to give way from mere distention alone. It must be extensively degenerated before its structures yield to even a considerable amount of pressure from contraction. This fact is illustrated by the following case, furnished by our friend, Dr. E. C. Esten. The woman had previously been a patient of ours, but four or five years before we became acquainted with her she had given birth to a living child, the labor with which, she represented as being very lingering and painful. She became pregnant the second time, and sought exemption, as she informed us, from the sufferings of a second labor, by provoked abortion at about the third month. A third pregnancy occurred; this she permitted to proceed to term, in accordance with our advice. When the labor came on, we were summoned to attend her; from a contraction of the pelvis, aggravated perhaps by the smallness of the size of the woman, the labor was excessively severe and protracted, but finally terminated in the birth of a living male child, after which she solemnly avowed she would never go through another labor at full term, and her avowal was most sadly verified. Her child died in a few weeks, and in due time she again became pregnant, when at about the third month. For the second time she found immunity from her great sufferings, in abortion, from the effects of which she came near dying. Metritis followed the expulsion of the ovum; whether it resulted from the means employed to provoke the early contractions, or from the violence of the uterine action, it is difficult to determine, as either might have caused such a result.

After three or four weeks' illness, during which she was reduced very low, and suffered greatly, she prayed for forgiveness, and promised the Lord if he would save her this time she would never be guilty of so great a sin again. She slowly recovered, and in due time was restored apparently to her usually good health. She became pregnant the fifth time, and forgetting her solemn and sacred promises, she again, in view of effecting an abortion, resorted to various drugs for that purpose. The party to whom she had formerly applied, having left the city, she was not so successful as upon the previous occasions. She nevertheless persevered with the most pertinacious obstinacy in her work of destruction, taking everything she could hear of, that was reputed as being efficacious in producing miscarriage, until the seventh month, when she abandoned her purpose, and became resigned to let her pregnancy take its course. As we were confined to our bed with illness, when her labor came on, Dr. Esten, as he informs us, was sent for about midnight. He found the labor progressing slowly, the os uteri unrelaxed and the parts dry and hot. Not deeming his services necessary he retired, and about 10 o'clock on the following day, was again summoned to his patient; the pains were not quite so severe, the os uterus still undilated, dry, and pulsating. In a few minutes after his arrival, in the midst of a very strong pain, she threw up her hands and exclaimed: "Oh doctor, there has something broke inside of me." Simultaneously with this the head, with which the finger was in contact, receded out of reach. Soon after her countenance began to change, getting pinched and blanched, the pulse sank, the body became bedewed with a cold perspiration, nausea, and vomiting dark coffee grounds matter ensued, the respiration hurried, and she expired, probably from the nervous shock, in about an hour after the exclamation.

Upon examination after death, the uterus was found ruptured to the extent of allowing the foetus, which was a large one, to escape into the cavity of the abdomen. The organ was very well contracted, and bore marks of a chronic inflammation of long standing. It is clear that the evidences of inflammation here noticed, were not derived from the metritis that followed the previous abortion; because the functions of the uterus were so far restored as to admit of a subsequent pregnancy, which proceeded to its full term; a circumstance that could not be expected, were it in such a diseased condition. The post-mortem appearances of inflammation were most probably due to the action of the drugs taken during the last gestation. In either case, it shows the danger of subjecting the uterus to such unwarrantable and repeated abuses, in endeavoring to provoke abortion. Even where the attempt may not be entirely void of justification, which may have been the case in this instance, from the contracted state of the pelvis, though the woman had pre-

viously, with great difficulty and torture, given birth to two living children.

This case shows that the uterus may be extensively diseased, and be distended by the presence of a large foetus, and still maintain a continuity of structure, until it shall become dissolved by the aid of contractions upon the resisting body within it. Laceration, of the uterus has resulted from the abdomen coming in forcible contact with some hard pointed object; as well as by missiles projected from fire-arms. The prominence of the abdomen during the latter stages of pregnancy, favors the reception of such injuries, in a greater degree, than where the uterus is empty and the abdomen less prominent. A remarkable case of this sort occurred many years ago, which was related to us by a former colleague in the Penn Medical University, who used to amuse himself by stating to the class, that he never was born, and setting them to conjecturing how he came into the world. Augustus De Kalb Tarr, Esq., M. D., who was both attorney at law and a graduate in medicine, and for three years before his death, and up to that event, Professor of Medical Jurisprudence, in that institution, has frequently stated upon the authority of his parents, and others, upon the eastern shore of Maryland, that when his mother was between eight and nine months advanced in pregnancy, his father and she were riding out in a chaise, the horse took fright and ran away, and in his course, upset the chaise and threw them both out; she was thrown against the sharp point of a rail, that was projecting from the fence, by the road side, with such force as to rip open the abdomen, and uterus to the extent of allowing the contents of the latter to escape through the aperture, which, besides the secundines consisted of the liquor amnii and a pair of male twins, of whom he was one; who was, at the time of the narration, over sixty years of age, and whose twin brother was then living and perhaps is yet. The mother and twin infants were carried upon a settee to the most convenient hotel, where the wound was dressed, and where she remained, until she recovered, sufficiently to be removed to her home, which was but a comparatively short time. The wounds healed kindly, the restoration to health was rapid and complete, and she lived for several years after. This case has been referred to by writers on surgery, as an illustration of the power of the *vis-medicatrix naturæ* in covering extensive and serious injuries.

2. *Symptoms.* There are no premonitory symptoms, indicating the approach of a rupture of the uterus, that can be relied on as such, as all the symptoms that have been known to be present, before the occurrence of a rupture, are merely incidental, because they have been observed scores of times, when no such accident has followed their appearance, and rupture more frequently occurs, without any premonitory symptoms whatever. A uterine rupture can only be

detected with certainty, when it is complete, and after it has occurred. Then the signs are rather diagnostic, than symptomatic of its existence. The first intimation that the accident has happened, is a sharp lancinating pain, during a severe contraction in some part of the abdominal tumor, over the seat of which, the woman suddenly places her hand, and cries out in utter anguish, or in alarm, with terror depicted upon her countenance, exclaims that something has broke or torn within her. Some have described the rupture as being accompanied with a report or noise noticeable to those present. More or less hemorrhage is observed from the vagina, her face soon gets cold and colorless, and the features contracted, the breathing becomes hurried, she is seized with sickness at the stomach, attended often, with retching and vomiting; the emesis consisting, at first, of the ordinary contents of the stomach, as ingesta, etc., then of a dark, or sometimes even black substance, resembling coffee-grounds, or the "black vomit" of yellow-fever. The pulse sinks, and becomes weak, frequent, small or entirely absent; the patient complains of her vision being lost, or obstructed by a mist before her eyes, is very weak and faint, and the whole body bedewed with a cold clammy perspiration, followed by convulsions and death, or death without convulsions, if not speedily relieved. The foregoing symptoms, most, or all of them, may be present in other forms of dystocia, besides a ruptured uterus; they cannot therefore be exclusively relied upon; but if they are attended with recession of the head from the superior strait, to the extent that it can be no longer felt; a deformity of the abdominal tumor, if it should become flatter, broader, or displaced to some unusual part of the abdomen, or marked by elevations and depressions, indicative of the irregularities of the foetal body, head and extremities, with a cessation of labor pains, there can be no doubt as to the character of the mischief.

3. *Diagnosis.* The absence of the foetus in the uterine cavity, and its presence in the abdomen, declare the rupture to be complete.

Should the bag of waters subside, after the symptoms of rupture are shown, and the foetus remain in the uterine cavity, the diagnosis is that the membranes have ruptured and discharged their waters into the cavity of the abdomen, the rent not being large enough to allow of the escape of the foetus.

Sometimes a portion of the foetus only passes through the rent, which fact may be determined by the presence of the presenting part being detected in the uterus, by the introduction of the finger or hand, while abdominal palpitation will betray that of the escaping part in the cavity of the abdomen. The presenting part will be found to recede from the superior strait, in proportion to the extent of the part liberated.

Where the rupture is partial, and confined to the mucous and

muscular structures, the peritoneum remaining uninjured, the bag of waters will recede from the os uteri, and protrude through the aperture in the uterine walls, and lodge between it and the peritoneum, and, though they remain entire, will not again appear within the circle of the os. This variety of rupture will be attended with milder symptoms, and an absence of the modifications in the uterine globe, that distinguish the complete rupture.

A rupture of the sub-vaginal portion is mostly attended with a loud cry, as the head is passing through the os, where the rent occurs. It does not interfere with the normal delivery of the child, nor generally give rise to any serious after trouble.

4. *Prognosis.* The prognosis of ruptured uteri is exceedingly unfavorable; it is almost always destructive to the child, and is equally fatal to the woman. As a rule, the complete rupture is fraught with the most extreme danger to both, though there are instances where both have survived the accident. In a partial rupture, where the peritoneum remains unrent, the chances of recovery, for the woman, are very materially enhanced, and those for the safety of the foetus, are very much less impaired, than when it is thrown into the abdominal cavity, and prevented from being delivered by the natural passages.

The death of the woman may result either from the shock of the nervous system, hemorrhage, inflammation, or strangulation of the intestine in the rent, in which it may have become engaged, and be strangulated by the contractions of the organ and diminution of the fissure.

When death results from the nervous shock, it generally follows the accident, before the system rallies; the depression first induced, continues to deepen, until death supervenes.

When the rupture occurs in the site of the placenta, the hemorrhage is more copious, and may cause death in a short time. The hemorrhage is in inverse ratio to the extent of the nervous shock; where that is light, the hemorrhage is greater, and *vice versa*. When the rupture happens in some other part of the organ, than at the point of placental attachment, the hemorrhage is comparatively small, because there are no large placental or utero-placental vessels ruptured; in such cases, where the shock is less intense, and the hemorrhage less severe, the chances for recovery are proportionally increased.

When inflammation results from the injury sustained by the peritoneum, it is characterized by the severity and danger usually attending peritoneal inflammation in an augmented degree; and when it occurs, it generally terminates in death, by mortification.

When any portion of the intestinal mass enters the rent, and, from contraction, it becomes strangulated, the phenomena presented are those of strangulated hernia, and if not relieved, causes death from inflammation and mortification.

5. *Treatment.* Though the accident most commonly results in the death of both woman and child, it has been found, nevertheless, that by timely and well-directed efforts, both have been rescued. The success of treatment depends, in a great measure, upon the extent of the lesion, and the facility with which relief can be afforded.

Where the rent is too small to allow of the passage of the foetus through it into the abdomen, and the head presenting at the superior strait, and the membranes entire, no time should be lost in effecting a delivery, as the danger is imminent of the opening being enlarged at each succeeding contraction, because, after the rent is once made, a much less degree of force will be required to enlarge it. If the pelvis be normal, and the os uteri dilated or dilatable, and there be evidences of a rupture in the uterus, the membranes should be ruptured at once, with a view of both preventing the rupture and discharge of waters through the aperture into the peritoneal sack, and to prepare for delivery, by the forceps, from the upper passage, which should be accomplished without delay. This mode of procedure is far preferable to turning, as directed by some authors, on account of their being less danger of increasing the rupture. Where the head has descended into the cavity of the pelvis, before the occurrence of the accident, the forceps should be used to facilitate the delivery, as promptly as possible. Where the rupture involves the mucus and muscular structures only, and the serous covering remains whole, with a favorable state of the pelvis, and condition of os uteri, and the waters unevacuated, the same course precisely is indicated. Where the rent is small and complete, or where it is incomplete and the foetus remains in situ, and the os uteri rigid, belladonna ointment should be applied, or chloroform, to the os, and at the same time opiates might be freely given, if not contra-indicated by a prostration of the system, to modify and reduce the strength of the contractions; in fact, if they should be entirely suspended while the means are being employed to dilate the os, it would be preferable to a continuation of violent contractions, during the rigidity. Where a part of the foetus has protruded through the opening, and a part remains in the uterus, and the os is in a condition to allow of the passage of the hand, it should be passed up and through the opening, and the feet seized and returned into the uterus and brought down, and the child delivered as in ordinary turning. If it be originally a breech presentation, and the head and upper part of the body be protruding through the rent, the feet must be grasped and brought down, and the labor consummated in that way.

Where the rupture is complete, and occurs at the utero-vaginal junction, and the foetus has wholly escaped into the abdomen, it is

directed to pass the hand through the aperture and grasp the feet and return it into the uterus again, and deliver it through the natural passages. This is much more easily recommended than accomplished, as the uterine contractions, after the escape of the foetus from the cavity, suddenly diminishes the aperture so considerably as not to permit of such a feat being executed. Where the contractions are imperfect and the rent but tardily decreased, such deliveries have been effected, but with such great difficulty as to render it almost unjustifiable. Where the rent occurs in the body or fundus, and the foetus escapes, the attempt to return it is more difficult than in the former case, yet it has been accomplished.

In head presentations, with the foetus *in situ*, when the pelvis is too much contracted to allow of its passage, recourse must be had to craniotomy. When any portion of the intestines protrude through the opening into the cavity, it must be dislodged as soon as possible to prevent strangulation.

In all the manipulations employed to extract the foetus, where it protrudes in part through the rupture, whether by turning, the forceps or crotchet, it is almost always necessary to steady the uterus, and press the foetus down towards the os, and hold it there, by both hands of an assistant; the latter manœuvre is less needful where turning is employed than where the forceps or crotchet are used: indeed, where turning is attempted, little other aid can be rendered by an assistant than to steady the uterus by placing a hand on each side of it, and making such pressure as may be necessary, without interfering with the operation. Where the vagina is ruptured, the prognosis is very much more favorable, because there is less hemorrhage, less danger of serious inflammation, and the foetus may be delivered through the natural passage.

Gastrotomy, from *γαστηρ*, *gaster*, "the belly," and *τομη*, "incision," an incision made into the abdomen, to remove any substance, or correct any condition that may be prejudicial to the well-being of the subject, or endanger life. In the present connection it is resorted to for the purpose of removing the foetus from the abdomen, after it has escaped from the cavity of the uterus, through an unnatural aperture, caused by an accidental laceration of its structures.

According to Dr. Dewees, this operation was never performed on a living subject, in this country, previously to the year 1830, though its practicability had been established by several successful attempts in Europe. It is only under the most favorable circumstances of ruptured uteri, that an effort to remove the foetus by this means, is justifiable. Where the foetus has passed entirely out of the uterine cavity; where the system has not suffered materially from the nervous shock, nor become exhausted by the severity of the labor, nor debilitated by hemorrhage, and where

the operation is made shortly after the occurrence of the accident, there may be some prospect of success. Terrible as is the contemplation of this dernier resort, heightened by the presence of the dreadful disaster, and the perils of an almost unavoidably fatal peritonitis, wherein lies the greatest danger, where the patient has escaped death from the shock or hemorrhage, it is nevertheless justifiable, and even advisable, as affording her the only shadow of a chance of recovery, where death otherwise is inevitable. Though a case is recorded, that happened in Germany, and was successfully operated upon by Mr. Bulk, two years and three months after the occurrence of the accident, during which time she again became pregnant, and was delivered of a large child at full term; carrying within the cavity of her abdomen, throughout gestation and parturition, the dead carcass of a foetus, of eight months and full size, with the secundines; an abscess in the abdomen, just below the umbilicus, leading to the detection of its presence, putrefaction having just commenced. A case of ruptured uterus, in which there was swelling of the abdomen, vomiting, irregular breathing, etc., was successfully operated upon by Professor Cecconi, two hours after the occurrence of the accident, in which both mother and child were saved. This was on the 9th of August, 1817.

To these achievements of science, American Surgery has more recently added several brilliant exploits. Drs. Neil and Mason, of this city, a few years ago, removed a foetus from the abdominal cavity by gastrotomy, with perfect success.

The following case, reported by Dr. D. Hayes Agnew, is full of interest and importance, and is without a parallel in the records of surgery, for the lustre of the results attained, the boldness and originality of thought it displays, and the triumphs of science in the promotion of comfort and the preservation of human life, by surmounting difficulties never before overcome.

"A. M., an Irishwoman, about thirty years of age, during a severe labor with a first child, ruptured her uterus, the child escaping into the abdomen. The foetal head had not passed below the superior strait of the pelvis, the diameters of which were contracted. The case being under the care of the medical officers of the Nurses' Home, Dr. Ellwood Wilson was immediately summoned to her aid by the attending physician, Dr. Scholfield. The propriety of the *abdominal section* admitted of no question. The operation was accordingly performed by Dr. Wm. Byrd Page, the child removed through the parietes of the abdomen, and the life of the mother preserved.

A Vagino-vesical Fistula, and its Treatment. Some time after, it was discovered in this case, that the rent in the uterine walls had extended through the cervix and involved the vagino-vesical septum, giving rise to a fistula. After the restoration of the woman's gen-

eral health, she was placed in St. Joseph's Hospital, and at considerable intervals, three unsuccessful attempts were made to close up the orifice, which was situated near the cervix uteri, and running in an oblique direction, about three quarters of an inch in extent. Two of these operations were skilfully performed by the Bozman method, employing as a retentive mechanism, a lead plate or button. The patient was afterwards placed in the Philadelphia Hospital, under my charge, where, after some preliminary treatment, to improve the general condition, she was operated on by my usual method, seven silver sutures being required to close it properly. On the eighth day the stitches were taken out, and the wound found to be only about one-half closed. On carefully examining the parts, and reflecting over the former failure, I thought I discovered the true source of the difficulty, which subsequent events confirmed. The proximity of the fistula to the cervix uteri, the latter organ being somewhat retroverted, prevented an accurate adjustment; indeed the os was turned into the fistulous opening, and passed towards the bladder. Profiting by this observation, at the second operation, undertaken nine weeks subsequently, I determined to turn the os into the opening permanently. With this end in view, the inferior semi-circumference of the fistula was well pared, next the posterior half of the cervix uteri, after which eight silver sutures were introduced, and secured by the shot, the ends of the wire being cut off close to the latter. The os uteri was by this method turned into the bladder. Nothing worthy of note transpired during the subsequent progress of the case. On the eighth day following the operation, the parts were examined with a view to remove the ligatures, which were found in such excellent position, without any surrounding irritation, that, at the suggestion of Dr. E. Wilson, who rendered me valuable service in both operations, I was induced to allow them to remain two days longer. On the tenth day they were clipped out, and to our great satisfaction, the fistula closed. Since that time this woman has menstruated regularly through the bladder, enjoyed comfortable health, been able to support herself as servant to a private family, and certainly rid of a most distressing and disgusting malady. Two years after, I operated on this same patient for strangulated umbilical hernia, from which she recovered without any unusual symptoms. It is not often we meet with an example of so many grave accidents, operations, and good recoveries in one person, as are represented in the narrative of this poor, friendless Irishwoman."

The position of the foetus in the abdomen, must determine the point at which the incision must be made; the linea alba should be preferred, on account of avoiding important arteries, either above or below the umbilicus. The details of the operation are so analogous to those of the Cæsarian, before opening the uterus, that the

student is referred to the latter, for direction how to proceed with its performance. Gastrotomy should never be resorted to where it is possible for the foetus to be extracted through the natural passages.

SECTION VI.—INVERSION OF THE UTERUS.

While this, which we are to consider as one of the accidents of parturition, cannot be regarded as interfering with the expulsion of the foetus, it sometimes constitutes a very serious hindrance to the convalescence of the woman, and, indeed, proves fatal to her existence. Its presence and gravity often become the occasion for the most prompt and energetic efforts for her safety. Viewed in the light of a very alarming complication of labor, commonly occurring before its termination by the expulsion of the placenta, we assign to it this position among the causes of dystocia.

Authors uniformly agree in describing three degrees of inversion. The first is *depression*, the second *partial*, and the third *complete*. The recognition of these degrees is due to Mr. Newnham, and they have been adopted by his successors with great unanimity, as expressive of the condition of the organ when subject to the accident.

While we admit degrees of inversion, we object to the terms usually employed to designate them. As a depression of the fundus is regarded as a degree of inversion, it must constitute a partial inversion. Then, according to the nomenclature universally adopted for the different degrees, we have, virtually, the first *partial*, the second *partial*, and the third *complete*. This really admits of but two degrees, first, *partial*, expressed twice, and *complete*. We would suggest the following, as an improvement upon the present arrangement, inasmuch as it is conceived to be more expressive of the real state of the organ under any degree of inversion, and more in accordance with scientific accuracy.

We would say there are two degrees of inversion, first, *partial*; second, *complete*. The first embodies two varieties, the first depression, and the second extrusion; the fundus being the part depressed or extruded.

Inversion of the uterus consists in the organ being turned inside out; and the different degrees indicate the extent of the partial inversions, with reference to the uninverted parts, including the complete.

Partial inversion consists of the organ being partly turned inside out, and presents two varieties; the first, depression, is where the fundus is depressed within the cavity, but does not engage in the os uteri, and, of course, is not protruded through it, nor does it form any tumor in the vagina; the second, extrusion, is where the fundus is depressed so far as to engage in the os uteri, is protruded

through it, strongly invested by it, and forms a semi-spherical tumor in the vagina, of a size corresponding to the extent of the extrusion; the third, complete, is where the whole organ, fundus, body and neck, is completely inverted, with the external surface presenting the lining structure of the interior, and the internal coated with the peritoneum, and containing the ovaries, Fallopian tubes, etc. The form is that of the uterus after recent delivery, only the os occupies the most elevated part of the tumor, and is enclosed within the vagina, at its superior extremity, which is also partially inverted, where it may be felt through the vaginal walls, forming a kind of circular thickening; the fundus forms the lower boundary of the tumor, and is found external to the vulva, while the neck and body, in part, occupies the vagina, and the other part the world without.

Causes. Inversions of the uterus, occurring in connection with labor, have generally been attributed to mechanical causes almost exclusively; but Dr. Tyler Smith refers them rather to a physiological origin, and avers that it depends, in *all* cases, mainly upon an *active* condition of the uterus. The accident has usually been associated with efforts at the delivery of the placenta as its cause, such as pulling forcibly at the cord, with a view of detaching it; or, in case of hemorrhage, an attempt to rapidly extract it by the hand, while the uterus is in an atonic or relaxed condition. In fact, any injudicious means forcibly employed to remove it immediately after delivery, that have been followed by the accident, have been regarded as the cause of its occurrence. But even in such cases, where the placenta is attached to the centre of the fundus, and where the cord is drawn through the vagina, with any amount of force likely to be exerted by an accoucheur, Dr. T. Smith says: "It is not a mere mechanical displacement which produces the accident, but the irritation of the fundus uteri, by traction, excites contraction of the fundus, thus producing that contraction and descent of the fundus uteri, which is the first stage of the accident." He continues: "According to my view, the depression of the fundus, in these cases, is not a simple yielding of the part, according to mechanical principles, but an active contraction, excited by the irritation of the fundus uteri by the traction of the placenta."

We can conceive no reason why traction upon the cord, with a force, merely sufficient to remove it, while the uterus is in a state of inertia, flabby and exhausted, with the placenta undetached at the fundus, may not, cause a partial or complete inversion, in accordance with mechanical principle, without reference to physiological action, almost as readily as an empty sack, with a cord attached to its closed end, and made to pass down through its cavity, and to be drawn upon, at its mouth, would invert it.

While we admit of the possibility of an inversion from purely mechanical causes, we are free to accede to the agency afforded, in its production, by physiological action, and have no doubt that the accident, in many instances, is due to a unity of the two causes, rather than to the exclusive operation of either.

Too short a chord, or one of usual length, shortened by being coiled about the body and neck of the foetus, have been classed among the causes of this accident by some authors, but Churchill, and some others, regard such as highly problematical.

Irregular uterine contractions, such as attend and succeed very rapid labors, have frequently been known to accompany inversion, and perhaps cause it. Violent voluntary efforts in conjunction with irregular uterine action undoubtedly favor the recurrence of the accident.

It has been known to follow, spontaneously, very natural labors, without any visible or appreciable cause. Such cases have been attributed to diseased conditions of the uterus, at the same time, as active contractions of some parts, the fundus and body, for instance, and atony of the others, as the neck and os.

It is evident, that in all cases of protrusion and complete inversion, the os must be in a state of great relaxation, or the escape of the upper parts of the organ could not be so readily effected. A contracted and rigid condition of the os uteri, would constitute an efficient prevention of the accident, let that of the superior parts be what it may, either active or atonic.

Symptoms. The symptoms of inversion, occurring immediately or shortly after delivery, are often of the most alarming and dangerous character; this is more especially the case when the displacement is nearly or quite *complete*. The phenomena here presented, indicate plainly the serious and important character of the accident, and demand the most decisive and energetic action for its alleviation. A sudden exhaustion or death-like sinking, immediately after the inversion, in the absence of hemorrhage, or when it is too trifling to account for such a result, is almost universally the first symptom to excite suspicion of its presence. In harmony with this condition, the countenance becomes deadly pale, the voice feeble, the pulse rapid, small and fluttering; nausea and vomiting occur, attended often with great distress and restlessness, altogether threatening the patient with sudden death.

Convulsions have, by some authors, been added to the above catalogue of symptoms, but the nervous agitations and restlessness preceding dissolution, have, it is thought by others, been mistaken for convulsions.

Where the inversion exists in a less degree, the symptoms are correspondingly less decided and alarming.

When hemorrhage occurs, which it occasionally does to a con-

siderable extent, simultaneously with inversion, the above-described phenomena are not changed in their character, but proportionally enhanced in severity, rendering the danger of the patient more imminent. When this takes place, faintness quickly follows, and a sense of fulness in the vagina, which is almost always rapidly succeeded by death. (*Newnham.*)

Upon our suspicions of inversion being excited by the presence and unusual continuance of the foregoing symptoms, or a portion of them, an examination per vaginam, should be made immediately, to ascertain their cause, and if possible remove it.

The same nervous symptoms and exhaustion are always present in complete inversion, occurring in connection with labor, in the absence of hemorrhage, as in its presence, though in a less terrific degree; but resuscitation from them is as difficult in the former instance as in the latter.

The uterine contractions accompanying inversion, or immediately preceding it, are so severe and labor-like, that the patient is led to believe the expulsion of a second child is about to take place. The pain, and dragging from the loins, are very distressing, and occasionally attended with a retention of urine. Pressure upon the hypogastrium fails to reveal the presence of the large contracted uterus, which it should do if it were not absent. This, in connection with the severe pain complained of, which, after delivery, is always indicative of uterine contraction, constitutes a symptom of great value.

In partial inversion, either the degree of depression or extrusion, the cup-shaped body of the uterus may often be felt through the abdominal walls, above the os pubis, especially where the parietes are not thickened by a superabundance of flesh.

Where there is merely a depression of the fundus, and no portion of it has been extruded, very little or no information can be gained by an internal examination, further than to ascertain that it is nothing more serious than a depression. But if the fundus be engaged in the os uteri, with a portion of it more or less protruding, the vaginal examination will reveal the true state of the case, which will present a globular, sensitive, elastic tumor, with a rough and bleeding surface, broader below than above, and tightly encircled by the os uteri. Should the extruded part be found irreducible, it may be attacked by inflammation, from strangulation, and terminate in gangrene, sloughing and death. The undetached placenta, when present, will augment the size of the tumor to a considerable extent, which will vary according to the amount of the extruded part.

When the inversion is *complete*, the tumor, of a red color, when recent, may be seen protruding through the vulva, and occupying the vagina throughout its whole length. The rough bleeding surface will be more extensive as the inversion is more complete.

Diagnosis. Each degree of inversion furnishes its own diagnostic marks. Simple depression is distinguished by the cup-shaped body felt through the abdominal walls, and the absence of the vaginal tumor, and also of the presenting body, in the os uteri.

Extrusion is marked by the depression of the fundus, as above indicated, and by its protruding through, and being strongly encircled by the os uteri, presenting a very perceptible, rough, bleeding tumor, at the superior extremity of the vagina, extruded below the circle of the os.

Complete inversion, is known by the size, and roughness of the tumor occupying the vagina and protruding through the vulva, and the hemorrhage attending its presence; by the absence of the os at its inferior extremity, and the absence of the smooth lining membrane of the vagina, that forms its external covering, in cases of extreme prolapsus; in fact, viewed in comparison with procidentia, its rough, flocculent and bleeding surface, and its unvarying size, abundantly distinguish it from that accident; and these, with its much greater hardness, determine the difference between it, and prolapsus of the vagina.

Treatment. The phenomena presented by each of the three degrees of inversion, require a different mode of procedure, varying in regard to the facility or difficulty of its application, according to the simplicity or complication of the accident. Let whatever be the degree of inversion, or the complexity attending it, that may, there are but two indications to be answered: the first is to restore the uterus to its normal position, and the second, to prevent a recurrence of the accident; and the ease or difficulty with which these points can be carried, will determine, to a great extent, the success or failure of the treatment.

Cases are related of a spontaneous restoration of the organ, to its normal position, by its own inherent powers of contraction. But to delay interference, under the delusive hope that such a fortunate occurrence may take place, would, in most instances, be procrastinating the auspicious moment beyond the favorable time for action, and incurring the risk of being involved in difficulties that might prove insurmountable.

If, upon examining the abdomen after the birth of the child, to ascertain the state of contraction of the uterus, a depression of the fundus be detected, whether other symptoms of inversion be present or not, the hand should be introduced entirely through the os uteri, into the cavity, and the depressed fundus gently and continuously pressed upwards, until it is felt to recede before the hand, and become restored, which it frequently does with a perceptible bound.

This manœuvre requires no particular position, other than the one occupied during delivery; and the discharges will afford a sif-

ficient lubrication for the hand; so the recommendations of some authors, that a certain posture be observed, and the hand be well lubricated, preparatory to commencing the operation, are wholly unnecessary, being little other than a useless parade, or idle ceremony.

In case of extrusion, the restoration is often not so easily effected; sometimes the protruding portion is so tightly encircled by the contracting os, as to amount almost to strangulation: under such circumstances the difficulty must not be attempted to be overcome by the application of force, but rather by address. The first effort should be, to induce a relaxation of the os; for this purpose vencsection has been classed first among the various means recommended. The lancet, in the absence of other and better resources, may be employed in overcoming the rigidity of the os. Sometimes this resists a very free abstraction of blood, while at other times the remedy seems to act specifically on the constricted part, causing an almost immediate dilatation, without reference to the quantity taken. Lobelia inflata acts as a very prompt and certain relaxant, and is adapted to those cases where venedection is inadmissible. It should be given freely until the patient is brought fully under its nauseating effects; administered largely, as an enema, it often acts more promptly in relieving rigidity of the os uteri, than when given *per orem*. Chloroform, by inhalation, has been employed with very satisfactory results in analogous cases, and might probably be used with great advantage here. Warm baths, fomentation, extract of belladonna locally applied, opiates, and in fact, every means tending to produce relaxation, or control symptoms of inflammation, are not to be withheld while there remains any prospect of success in surmounting the difficulty.

Should the constriction yield to the resources employed, then the fundus should be pressed upwards, and restored to its normal position, as directed in case of a simple depression. In case of a failure, however, in accomplishing this, the patient can scarcely hope for a better fate, than to be obliged to endure the inconvenience and suffering incident to her situation during the remainder of her life; unless relieved by a kind stroke of fortune, through the spontaneous action of the uterus; or she submit to a division of the os uteri with a bistoury, as has been recommended, and which may be attended with success and with but little danger.

The restoration of the uterus, in case of complete inversion, is attended with still greater difficulty than is encountered in the management of extrusion, either where the accident has existed for several hours or days, or where it is of a more recent occurrence. In the former case the os uteri contracts, so as not to allow the body and fundus, which are now exterior to it, being reduced, without a more determined effort on the part of the practitioner, to secure its relaxation and dilatation. But we are not to regard the

reduction as hopeless, even though the inversion be of several days standing, the wretchedness of the patient's condition, should induce us to make every exertion for her relief, however gloomy the prospect of success may appear. Cases of perfect reduction are recorded where the displacements have continued from six or seven hours to sixteen months.

"Dr. Gazzam, of Pittsburg, Pennsylvania, succeeded in a case on the tenth day after the inversion. Tartrate of antimony was administered in nauseating doses for twenty-four hours, by which sufficient relaxation was obtained to allow of reposition." (American Journal of Medical Science, April, 1844).*

In recent cases, where the os uteri has not yet become contracted, and those of longer standing, where it has contracted, and been relaxed by well directed efforts, the reduction must be attempted in a similar manner; in the latter instances the bladder and rectum must be evacuated before making the attempt. Here it will be necessary to place the woman in the most favorable position for operating, which is upon her back, with her thighs flexed well upon the abdomen, and the legs upon the thighs; the pelvis and abdomen should be elevated higher than the chest, and the chin inclined upon the breast; the knees should be separated at a comfortable distance asunder; and in cases of long standing where the uterus and soft parts have become dry, they must be well lubricated, as well as the hand of the operator. Should the inverted uterus or neighboring parts be much swollen, or the patient in a febrile condition, the swelling must be reduced by fomentations, and the fever subdued, before attempting a reduction.

Should the placenta be undetached from the uterus, in recent cases, it must be separated and removed before commencing the restoration; this is necessary in view of diminishing the bulk, which should be reduced as much as possible.

Should the accident be attended with excessive hemorrhage, efforts should be made to restrain it by the ordinary means, but it should not be allowed to prevent the attempt at a speedy reduction, which, with a uniform contraction of the organ, is the surest means of arresting it.

All the preliminaries being arranged, should the organ be too lubricous either from the discharges, or the lubricant employed, to be handled with advantage, in attempting its reduction, it should be enveloped in a soft dry napkin; then, after bringing the ends of the fingers and that of the thumb altogether, by placing the hand in the shape of a cone, they should be pressed steadily and firmly against the pendent fundus, in its most central part, and the pressure continued until an indentation is produced, which should afford

* Churchill on the Diseases of Females.

encouragement to persevere with the pressure until the fundus, carried before the hand, is made to pass the straits of the pelvis, in direction of their axes; and finally to resume its normal position. "Should the conjoined fingers prove too bulky, the stick proposed by M. Depaul, might be substituted for them with advantage." (*Cazeaux.*)

After the reduction has been completely effected, in either of the degrees of inversion; the second indication, which is to prevent its recurrence, is readily answered by allowing the hand to remain in the uterus until it is so far contracted as to be secure against a return of the accident, or until it is expelled by the action of the organ. Care should be taken when the napkin is employed, that it be removed with the hand.

In case of complete inversion, very little impression can be made towards effecting a reduction, until the vagina shall have been so compactly filled with the receding mass, as to put its walls upon the stretch, unless the organ be in a very inert state. Shortly after the uterus is prevented from taking a lateral direction, by the resistance offered by the vaginal walls, it yields to the firm, continuous pressure upon the fundus, until it becomes entirely reduced.

Where the inertia is so excessive as to interfere with the due contraction of the organ, after its reduction, the presence of the hand within its cavity, will tend to overcome it; or more or less movements of the inverted hand, or hardish friction, or gentle thumping, with the fingers against the inner surface of the uterine walls, will seldom fail to excite the desired contractions.

After inversion has happened once, it is known to be likely to recur after subsequent deliveries, on which account it is advised to abstain from drawing at the funis, in attempting to remove the placenta. And as a further precaution, some practitioners recommend the introduction of the hand, and the seizing of the placental mass; allowing both to be expelled by the normal contractions of the uterus.

CHAPTER II.

INSTANCES OF DYSTOCIA DEPENDING UPON ACCIDENTAL CAUSES OCCURRING AT THE TIME OF LABOR, PERTAINING TO THE FŒTUS.

SECTION I.—PROLAPSUS, OR PREMATURE DESCENT OF THE CORD.

A PROCIDENCE of the umbilical cord is essentially an accident peculiar to parturition; and its importance is derived, from the

great jeopardy in which it places the life of the foetus. So far as the safety of the mother is concerned, it is of no consequence, as it can in nowise interfere with the process of the labor, either in retarding or accelerating it, or rendering it more or less painful or difficult; its presence, therefore, renders the labor dystocial on account of its influence upon the child, and its well-being, that calls for the interposition of art.

Fortunately for the unborn of the race, it is not of very frequent occurrence, though it is encountered sufficiently often in practice, to entitle it to due consideration, among the causes of dystocia.

According to the reports of Madame La Chapell, Michælis, Churchill, and Collins, in 125,687 labors, it occurred 514 times, or a little over 1 in every 244. These being hospital reports, it is thought, by some authors, to be less seldom met with in private practice. No presentation is exempt from a liability to it. It has been met with in those of the vertex, face, breech, feet, trunk, and in complex presentations, as of one hand and one foot, hand and head, hand and breech, etc. It is known to occur in premature labors, as well as those at term; and in cases of dead and putrid foetuses as well as living.

Causes. A variety of circumstances have been mentioned as causes of a premature descent of the cord, among which are its excessive length, excess of liquor amnii, excess in the size of the pelvis, obliquity of the uterus, malposition of the foetus, attachment of the placenta near the cervix uteri, etc. A sudden gush of the liquor amnii, upon the rupturing of the membranes, is said to carry down a loop of the cord, with the current; we not long since witnessed an instance of procidence of the cord, which was forty-eight inches in length. From this cause, or rather two of these causes combined, for there was a superabundance of liquor amnii, as well as an excessive length of cord, and when the membranes ruptured during a powerful contraction the waters gushed forth with great force, carrying with them, a loop of the cord, about twelve inches long, which prolapsed from the vulva. Notwithstanding this, and many other similar instances upon record, such cannot be estimated as a uniform cause of the accident, for it often occurs where no such conditions exist. Indeed no one, nor combination of the alleged causes mentioned in the forgoing list, can be esteemed as such really, for the accident has been known to occur, in the absence of all of them, as often as where one or more of them were present. Where it does happen in connection with the existence of one or more of the alleged causes, it may be the result of their action. But where it occurs in their absence, or in that of either of them, or of any other known one, it must be regarded, rather as accidental than as a consequence. There are other conditions of the cord, that cannot, in the present state of our knowledge, be viewed in any other light than as purely accidental, such as too long or too

short a cord, or the fact of its being coiled about the neck or body of the foetus, and even the twist that constitutes one of its prominent characteristics cannot be looked upon as any other than the result of accident, because if it was the effect of a uniform cause, the twist would, of necessity, be uniformly the same, which we know is not the case. So also is it with procidenee, and all the other anomalies observable in it. That there must be some determining force that gives direction to the prolapsing cord, as well as to the other aberrations, for which it is remarkable, is readily conceded ; but what that force is, remains for further inquiry ; all attempts at an explanation, have hitherto been but visionary speculations.

1. *The Indications*, by which a prolapsus of the cord may be predicted, are few and most unsatisfactory, and can exist only before the membranes are ruptured ; for, after that event, it falls down into the vagina, and may, if long enough, protrude through the external labia. Before the membranes are ruptured, it may sometimes be felt through them, like an irregular pulsating body, which slips from under the finger, upon the least pressure being made upon it. Should the head be engaged in the superior strait, and the part of the cord that precedes it be confined between it and the membranes, it may be more easily distinguished, because it will be retained in the one position, and its loop or doubling can be more readily felt, and the pulsation more plainly perceived. Unless due care be observed, the folds of the scalp may be mistaken for doublings of the cord, and the pulsations of the arteries distributed about the cervix and os uteri, for those of the cord ; but such an error in diagnosis, in this instance, would be unimportant, as no evil consequence could result from it.

The prognosis is governed, in a measure, by the part of the pelvis through which the cord passes, the length of time required to effect the delivery of the child, or the success attained in restoring it and keeping it within the uterus. Should it pass down by the side of the sacro-vertebral angle, and over the saero-iliae symphysis and out by the sacro-sciatic ligament, or down behind the symphysis pubes, it would be less liable to suffer from compression than when it descends over the brim of the pelvis laterly. In the first instance, it is less exposed to pressure, both from the position of the head or breech, which presents laterly, and its own situation beside the sacral promontory. In the second instance, if it should occupy the space between the side of the head and the symphysis pubes, it would be exempt from pressure during the passage of the head through the superior strait ; and after the rotation of the head, the space between the occiput and the apex of the arch, even during its passage through the inferior strait, would be sufficient to preserve it from any very injurious compression.

These circumstances, in a measure, mitigate the imminence of the danger from compression, to which mainly, and perhaps wholly, the death of the child is due in those cases; notwithstanding, it is the opinion of some authors, among whom we might mention Velpeau and Guillemot, that when the cord protrudes without the vulva, the blood becomes chilled, and perhaps coagulated, and in this wise interferes with the placento-fœtal circulation to the extent of asphyxiating the fœtus. This view is opposed by Delamotte, Baudelocque, and Madame La Chapell, the latter having seen instances where the cord protrudes through the vulva, fully exposed to the atmospheric temperature for several hours, without the fœtus suffering in any wise therefrom, because there was no pressure upon it. Some of these cases travelled a considerable distance, either on foot, or in some vehicle, from their residences to the hospital. Some authors, who concede that the death of the fœtus is caused wholly by pressure upon the cord, maintain that it dies of apoplexy, from an excess of blood being retained in the brain, because pressure upon the arteries prevents its return to the placenta, while others hold that it dies of anæmia of the brain, or syncope, from a deficiency of blood in that organ, resulting from compression of the vein. These hypotheses are excessively visionary, inasmuch as, under pressure, all three of the vessels of the cord must be affected alike, as would be the case with the three strands of a rope when compressed in a vice. Asphyxia is, unquestionably, the cause of the death of the fœtus, for, by arresting the placento-fœtal circulation, by compressing the cord, the only means of oxygenating the fœtal blood, or connecting the venous into arterial, is cut off, and asphyxia, analogous to that variety, caused by suffocation, is the result. It is not always that the two portions of the cord, forming the loop, descend through the pelvis together; but, by becoming separated, one passes down through one, and a favorable region, and escapes pressure, and the other through a more unfavorable one, and suffers a fatal compression. One portion may come down on one side of the head, and the other on the opposite side, and, by encompassing it, hold it as in a sling.

Where conditions favor a speedy delivery, spontaneously, or where the circumstances admit of no delay in effecting it artificially, the danger is correspondingly less, where the cord is under pressure, than where the process is protracted, for it can bear a few minutes compression without any very serious consequences.

Where the cord can be restored to the cavity of the uterus, and maintained there until the end of the labor, all danger of compression is removed, and its consequences, of course, avoided.

2. Treatment. If the fœtus be dead, the necessity for interference no longer exists, and the labor may be left entirely to the

powers of the organism. But how are we to ascertain that the foetus is not living? There is a number of signs that have been laid down, indicative of the death of the foetus, such as, first, an absence of foetal motion; second, a sense of dullness and weight in the uterine regions; third, a sense of coldness in the uterus; fourth, the escape of meconium in head presentations; fifth, a putrescent odor of the liquor amnii; sixth, flatus in the uterus; seventh, a want of cerebral pulsation, etc. None of the foregoing signs are reliable; no one, nor a combination of any part, nor the whole of them, is sufficient data upon which to base a course of procedure, involving the life of the foetus, whether it be positive or negative action. Any positive action, based upon such evidence of the death of the foetus as the operation of craniotomy, or negative movement, as to abandon the labor to the resources of nature alone, when they are known to be impotent to save it, if living, would be alike erroneous and unjustifiable. We have seen all these signs present, and the foetus still alive.

There are signs, however, that indicate the certainty of the death of the foetus, and upon which the accoucheur can base his course of action, without fear of being misled by a wrong diagnosis. They are, first, a loss of pulsation in the cord, which is strengthened by its being cold, of a greenish color, and shrunken; second, desquamation of the cuticle of the presenting part; third, looseness of the bones of the cranium; fourth, emphysema of the scalp; fifth, absence of the sound of the foetal heart. Where one or more of the latter exist, there can be no doubt as to the death of the foetus, because they are all conditions of death.

If the foetus be living, the prolapsed portion of the cord, in the *absence* of pain, will pulsate vigorously and regularly, which indicates its freedom from pressure; but should the pulsation be suspended *during* the pain, it would evince that it is compressed for the time being.

While the cord remains in this condition, and the labor is progressing rapidly, with all the parts duly relaxed, it may be permitted to continue, without intermeddling, until its termination. But if, in the course of the process, the force of the pulsations be found diminishing, the duration of the pains increasing, and the intervals growing shorter, it is evident that, in the descent of the head, the cord is brought under pressure, to some extent, during the absence of pain, and entirely so, while it lasts. Should the head be fully engaged in the superior strait, or be occupying the pelvic cavity, it should be grasped with the forceps, and delivery effected as speedily as possible. Should the head be yet above the superior strait, and the labor progressing slowly, the pains inefficient and far apart, the membranes ruptured and the cord prolapsing, and the os uteri sufficiently dilated to allow the hand to pass, it is

directed by some authors to introduce the whole hand, and carry up the prolapsing loop and hitch it over one of the limbs of the foetus, and thus prevent its re-descent. This is mostly attended with a greater amount of difficulty than might be supposed at the first view; but according to Guillemot it is preferable to turning; it is certainly attended with less embarrassment than the latter operation, especially if the accident be complicated with a contraction of the pelvis, however slight. If, however, this manœuvre be impracticable, an effort should be made to return it to the cavity of the uterus, and retain it there. Various means have been suggested for accomplishing this. The oldest method, and perhaps the most effectual one, when the external parts and the os uteri are favorably disposed, is to introduce the hand into the vagina, and carry the cord up above the brim of the pelvis, and hold it there during several contractions, to prevent its re-descent. When the prolapsed portion is very long and cannot be reduced at once, it is recommended to gather it up and press it back a little by little, as we would reduce a hernia; another suggestion is to roll it up like a ball and thrust it all up at once; either plan may succeed. The difficulty of reducing the prolapsus is not insurmountable, but that of retaining it in the uterus above the superior strait, will often be found very great. The greatest perplexity arises from its lubricity. This, however, is readily overcome by wrapping the prolapsed portion in a fine rag and introducing the whole into the uterus, and holding it there during two or three contractions. It can be maintained in position much better with this wrapping than without it. If the parts are not sufficiently relaxed to admit the hand, the cord can be introduced into the os uteri by means of the fingers, and then pushed up into the cavity with a smooth whale-bone, or rattan, with a piece of sponge attached to the end. By this arrangement it may be kept there until the head engages in the superior strait, or even descends into the cavity of the pelvis, after which it cannot protrude through the os, and consequently is free from the danger of compression. After the head becomes fairly engaged in the inlet, the whale-bone may be withdrawn without any danger of a recurrence of the accident. Guillemot recommends the instrument introduced by M. Dudan, for reducing and retaining the cord above the superior strait, which consists of a No. 9 gum-elastic male catheter, armed with a stilet, and having the loop of a piece of narrow ribbon introduced into the last eye of the catheter, and held there by the stilet passing through it; the ribbon is passed around the cord, if the loop be short, near the middle; but if long, it must be doubled up and the ribbon tied loosely around the duplicature. The instrument, with the cord thus attached to its extremity, is passed up into the cavity of the uterus, carrying the cord with it. This operation may be assisted by two or three fingers of one hand

being placed in the vagina, to direct the instrument, and prevent the cord from slipping from the enclosure of the ribbon.

After the complete reduction being thus effected, the retention must be continued until the head becomes fully engaged in the superior strait, when the stilet may be removed, and then the catheter, leaving the ribbon attached to the cord within the uterus. This plan of reduction possesses no advantage over the last one suggested.

The postural treatment of prolapsus of the umbilical cord, which consists of placing the woman upon her knees, in bed, with her face and shoulders down, thus leaving the pelvis elevated, was first suggested and practised by Dr. T. G. Thomas, of New York. This position is represented to be very favorable to the restoration of the cord, and with but very little proper manipulation. Several successful cases are reported, where its reduction and retention have been thus effected with the greatest ease. From the favorable manner in which the plan is spoken of, it is certainly worthy of further trial.

Where the os uteri is undilated and rigid, precluding the possibility of a reduction by either of the plans mentioned, an attempt should be made to remove the prolapsed cord to a more favorable position in the pelvis, where it will be less exposed to compression; if it occupy an exposed position in the posterior half of the pelvis, the effort should be to shift it to one side or the other of the sacro-vertebral angle, and if a like portion of the anterior half be occupied by it, it may be removed to behind the symphysis pubis.

When none of the foregoing expedients can be made successful in reducing and maintaining the cord above the superior strait, and the labor be progressing tardily, with inefficient contractions, and the os uteri and the external organs favorably disposed, the delivery should be terminated by turning; and where the head occupies the pelvic cavity, and the cord continues to pulsate, recourse must be had to the forceps, unless the uterine action promises a speedy, spontaneous delivery. Where turning is determined upon, the hand that is introduced, should carry the cord up with it, to prevent compression, during the passage of the foetus through the pelvis.

SECTION II.—OF THE MALPOSITIONS THAT ARE NOT PRESENT UNTIL AFTER THE COMMENCEMENT OF LABOR.—SPONTANEOUS EVOLUTIONS OR SPONTANEOUS VERSIONS.

It is patent to all intelligent accoucheurs, that after the commencement of labor, *usually* before, but sometimes not until after the rupturing of the membranes, the foetus occasionally deviates from its original position in utero, by which divergencies, vicious

positions are converted into normal ones; and, on the contrary, normal ones into vicious. These freaks of the foetus were not unknown to the ancients, as they have given some crude directions, such as "shaking the woman," or having her "assume certain positions," for the purpose of restoring the head again to the pelvis. These movements of the foetus have been called *spontaneous evolutions* by Denman, and *spontaneous versions* by M. Murat.

Almost every part of the body of the foetus, it has been alleged, may present, besides the cephalic or pelvic extremity, as the nape of the neck, the shoulder, the back, the side, the breast, the abdomen, etc., as the result of these spontaneous evolutions, while on the other hand, when either of them has been present at the time of labor, whether from a previous existence, or from the spontaneous version, it has been corrected by the action of the uterus, and spontaneously converted into a normal presentation.

Velpeau questions the probability of a direct transverse position of the body in utero, which must be the case in either the back, breast, side or abdominal presentation. He says: "It is incontestable that the trunk sometimes presents at the superior strait otherwise than by the head or pelvis; this has been admitted by practitioners in all ages, and has been a thousand times proved by observation. But is it true that these presentations exhibit shades so various and multiplied as has been asserted by the authors? In the first place is it possible for positions that are frankly transverse, to take place either before or after the discharge of the liquor amnii, when the foetus is at full term and well grown? For that end it would be required that the transverse diameters of the womb should exceed the perpendicular; but even should such a disposition exist before the commencement of labor, can we conceive that it could maintain itself under the contractions of the gestative organ? Would not those contractions necessarily compel the head or breech to descend toward the os uteri?" Not necessarily.

What Velpeau regards as an almost conclusive argument against the possibility of a transverse position of the foetal body in utero, viz., that "it would be required that the transverse diameters of the womb should exceed the perpendicular," is an obstacle, in the way of accepting the proposition, by no means insurmountable, when we reflect that the uterine fibres are variously distributed; that some are oblique, some transverse, some circular, and some longitudinal; that they are disposed of in different layers, some interlocking with each other, etc., etc.

According to Cazeaux, and to the observations and convictions of all modern accoucheurs, the disposition of the muscular apparatus of the uterus is such, that all parts of the uterine surface tends towards the centre during contraction. That is, during a

simultaneous contraction of all the fibres. It is equally the conviction of all observers, that there is not a uniform contraction of all the fibres simultaneously in every labor. Cazeaux, in speaking of spontaneous versions, says: "I am inclined to believe that irregularity of the uterine contractions is not wholly foreign to such an effect." Velpeau himself, in speaking of encysted placenta, or hour-glass contractions, observes, that "it is always the result of irregular contractions of the womb after the escape of the foetus;" and when discoursing on the muscular structure of the uterus, he remarks, that "the oblique and longitudinal fibres predominate." Now, if these fibres predominate, with which proposition all anatomists agree, and the fibres of the uterus are susceptible of irregular contractions, in case the longitudinal and oblique fibres contract forcibly, while the transverse ones remain uncontracted, the effect must be to shorten the longitudinal diameter of the uterus, and proportionably prolong the transverse one, and induce the very reverse of the normal diameters of the uterus, which state Velpeau avers is only compatible with the transverse position of the foetus; the tonic contractions of the longitudinal fibres, in the absence of the lateral resistance, at the same time, are forcing the foetus into that position. Thus, while the irregular contractions of the uterus apply their force to the upper extremity of the foetal body, which, previously to such force being applied, occupied the vertical diameter of the uterus, and being highly lubricous, readily glides into the transverse posture. They are at the same time, by withholding the lateral resistance, preparing accommodations for it in that position. Hence it is quite possible for such an occurrence to take place at full term, and with a well grown foetus. The presence of the liquor amnii adds greatly to the accomplishment of this evolution, but it is not absolutely necessary to it.

By the term trunk is understood all that portion of the foetus between the shoulders and hips. This in very rare instances is known to present at the inlet, as the result of spontaneous evolution at the time of labor. According to Madame La Chapell, M. Dubois, Nagèle and Cazeaux, there are but two presentations of the trunk, viz.: the right and left lateral planes, or 1, the right, and 2, the left sides. Dubois distinguishes them as regular and irregular. The regular are where the lateral lines, or middle of the side corresponds with the centre of the superior strait, and the irregular, where the anterior or posterior regions in a measure, great or small, incline to the centre of the strait, which is due to the inclination of the foetus forward or backward. It is to these irregularities that must be referred all those presentations of the back, loins, chest and abdomen, as described by the older authors. According to this view, first enunciated by Madame La Chapell, and supported by the distinguished authorities just cited, neither the

anterior nor posterior median line of the body ever corresponds with the axes of the superior strait.

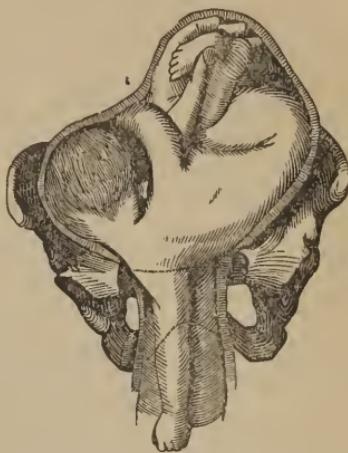
Shoulder Presentation. The lateral, or side presentation, is denominated, by Madame La Chapell, the *shoulder presentation*, because the shoulder is the most prominent point, and is mostly found occupying the centre of the superior strait. This presentation may be attended with a protrusion of the hand and arm into the vagina, or the hand may be encountered at the vulva, or seen externally, according to the state of advancement of the labor. According to the earlier writers, from the circumstance of the prolapsus of the arm and hand, they were distinguished as the hand and arm presentations, while, in fact, it was only a side presentation, accompanied by the accidental descent of the hand and arm—merely a casual circumstance, attending a presentation, instead of being one itself.

The right and left lateral or shoulder presentations have each two positions; in the first, of the right shoulder, the head of the foetus will be discovered in the left iliac region, and the dorsal plane corresponding to the anterior parietes of the abdomen; in the second, the head will occupy the right iliac region, with the dorsal surface corresponding to the posterior boundary of the abdomen. In a similar manner is the left lateral or shoulder presentation represented by two positions: in the first the head occupies the left iliac region, with the dorsum looking posteriorly; in the second, the head occupies the right iliac region, with the dorsum looking anteriorly. (Fig. 92.)

As regards the relative frequency of these presentations and positions, according to the reports of Madame La Chapell, the first position of the right lateral or shoulder presentation and the second position of the left lateral or shoulder presentation, in both of which cases, the back of the foetus corresponds with the anterior walls of the uterus, occur more frequently than the second position of the right, and the first position of the left lateral or shoulder presentation, when, in each case, the back of the foetus corresponds to the mother's loins.

Diagnosis. Should the evolution take place before the labor is far advanced, and while the os uteri remains undilated, a very fair estimate may be made in regard to the nature of the presentation,

FIG. 92.



SHOULDER PRESENTATION, WITH THE ARM PROTRUDING.

from the shape and appearance of the abdomen; several points may be observed indicating its character. 1. The transverse diameter will be found to exceed the longitudinal. 2. When the abdominal walls are sufficiently relaxed, the head can be distinguished in the iliac fossa, one side or the other, by its presenting a rounded resisting tumor. 3. The body may be felt through the parietes, by placing the hands opposite each other in the lumbar region, and the firmly resisting mass may readily be moved from side to side. 4. The uterine tumor will be found less elevated in the abdomen than when the foetus occupies the vertical position.

When the labor is farther advanced, and the os uteri dilated, but the membranes entire, very little positive knowledge can be obtained, but some conclusions may be drawn from the negative evidence afforded: 1. There will be an absence of the head at the superior strait, and 2. No part of the foetus can be reached by the exploring finger, but with great difficulty. More positive information may be derived occasionally by the detection of the hand or arm, through the membranes, at the superior strait. These signs combine to render the diagnosis very probable.

After the rupturing of the membranes, the uterus contracting more firmly about the foetus, causes the body to bend upon itself, so as to bring one of its extremities into or towards the fundus uteri, although the other be not in correspondence with the os; but this partial version increases the vertical diameter of the uterus, to such an extent that it now exceeds the transverse.

Auscultation is of but little or no service, as a means of diagnosis, in these lateral presentations.

After the rupturing of the membranes and the escape of the waters the shoulder will soon engage in the superior strait, and present itself near its centre. It may be distinguished by the finger coming in contact with the acromian process, at the summit of the presenting part, like a round tumor; in front may be followed by the finger, the S shaped clavicle, and posteriorly the spine of the scapula. The finger may also be placed in the axilla, below the shoulder, and below this again, the intercostal spaces may be discerned. The position of the head and dorsum, as above described, will indicate which shoulder is presented, the right or left. If the axillary space looks towards the right side of the woman, the head will be known to occupy the left iliac fossa, and *vice versa*. The scapula will determine the position of the dorsal plane.

It occasionally occurs, especially in the early part of the labor, before the side of the body is brought to fully occupy the superior strait, that the elbow alone is found entering the inlet; this may be distinguished by the well-known characteristics of the part, as the flexion, the olecranon, the condyles, one on each side, the

forearm upon the chest, etc. From the situation of the point of the elbow, the position of the head may be determined, as it always points in an opposite direction; for instance, if the point is towards the right side of the mother, the head will occupy the left iliac fossa, while if it points to the left, the head will be to the right.

Sometimes the hand and arm, separated from the side of the trunk, will be found protruding through the os uteri into the vagina, and even to or through the vulva. Where this is the case the character of the presentation is evident. Whether it be the right or left arm, representing the right or left shoulder, that is presenting, it may be determined by the direction in which the thumb points, with the palmer surface looking forwards, as it descends; if it points to the right, it will be the right arm and shoulder; if the thumb points to the left, with the palmer surface looking forwards, it will be the left arm and shoulder that are presenting.

Cazeaux makes a distinction between *spontaneous version* and *spontaneous evolution*. The first is where the transverse position, whether previously existing, or occurring during the early part of labor, is converted, by the spontaneous action of the uterus, into either a cephalic or pelvic presentation. The second is accomplished by the breech only, from the same action, descending through the pelvic canal, and being made to appear at the posterior commissure of the vulva. This rendering of the terms, entirely subverts that given by Denman and Murat. They are employed in this article as defined by the latter authors. Were they limited in their application to such movements of the foetus, only as are described by Cazeaux, the sudden changes of position, at the time of labor, as above mentioned, would be inappropriately named, and a new nomenclature would have to be provided for them; while we employ them in the sense, in which we have, we do not object to extending them so as to include the movements described by the distinguished Frenchman.

1. *Treatment.* That a malposition of the foetus may be rendered normal, by the spontaneous action of the uterus, is fully illustrated by the following case, related by Valpeau; though such instances are of rare occurrence, and the means that effected the adjustment of the position in this case should not be relied on longer than is compatible with safety, to both mother and child.

"Although the spontaneous evolution takes place most frequently where there is a superabundant quantity of liquor amnii, where the foetus is not large, where the womb is very much inclined, or where the pelvis is badly formed, it may, nevertheless, be sometimes observed in directly contrary conditions. Although it more commonly and easily takes place before the rupture of the membranes,

it is, notwithstanding, found to occur after the evacuation of the waters :

" A young woman, in her second pregnancy, was admitted into the hospital of the *Ecole de Médecine*, at ten, A. M., in the month of August, 1825. The os uteri was then but little dilated ; nevertheless, I discovered that the shoulder presented in the second position. The waters were not discharged until three o'clock in the afternoon ; four students who were already advanced, touched and recognized the presence of the shoulder, as I had done. I did not wish to bring down the feet ; the pains were neither very strong nor frequent, and I had some confidence in the assertions of Denman. At eight o'clock the shoulder was found to be evidently moved towards the left iliac fossa, and I could easily feel the ear to the right. At eleven o'clock the temple was nearly in the centre of the orifice ; the energy of the contractions was greater, and the os uteri completely effaced. At midnight the occiput came down, and in the space of an hour the child was expelled, in the right occipito-acetabular position."

If the arm that is protruding into the vagina, be found to recede, or draw up into the uterus, it is evidence that spontaneous evolution is going on, and that the safety of the woman, and the greater safety of the foetus will justify waiting until the evolution is completed, and the labor assumes its natural course, when interference will be unnecessary, or until the version be arrested in its progress, which will render the interposition of art indispensable.

In case of shoulder presentation, after waiting a reasonable time and it be found that the presenting part is gradually descending lower and lower into the superior strait, which process is usually very slowly effected, on account of the inability of the longitudinal

fibres to contract upon the foetus, while occupying the transverse position, the hand must be introduced and delivery effected by turning. Where the left shoulder presents, the left hand should be employed, and where it is the right, the use of the right hand is indicated. (Fig. 93.) By using either the left or right hand, agreeably to this direction the palmer surface will pass up over the anterior plane of the foetus, and the feet when grasped can be brought down in harmony with the natural course of the body, in front of the abdomen.

Denman, says that a majority of cases turning may be dispensed

FIG. 93.



TURNING IN RIGHT SHOULDER PRESENTATION.

with, a the uterus will most generally bring about the *spontaneous evolution*, and that if the child should really come down double, its escape would not on that account, be wholly impossible. Where there is any regard paid to the life of the foetus, such proceeding is inadmissible, for according to Denman's own showing only one child was born alive, out of thirty, which he entrusted to the spontaneous action of the uterus. Where the foetus is very small and the pelvis unusually large, or in case of abortion at five or six months the foetus may pass double, but where the usual proportions are maintained between the dimensions of the foetus and the straits of the pelvis, such a termination cannot be effected at term, and the woman, after enduring a protracted and painful labor, will be obliged to submit to artificial delivery, which will be rendered more difficult, from the fact of the shoulder being jammed lower, and more tightly into the superior strait, by the contractions of the uterus during the delay consequent upon waiting for the ineffectual efforts of the uterus to terminate the labor spontaneously.

Dr. Edwin R. Maxson has proposed a new method of managing shoulder presentations; it is the postural treatment employed by Dr. T. Gaillard Thomas, of New York, for the reduction of prolapsus of the umbilical cord.

He was first induced to try the experiment, in case of a prolapsed cord, complicated with an *abdominal presentation*. It consists of placing the woman upon her knees, with her face and chest down upon the bed. The effect of this position was to restore the cord, with the aid only of very slight manipulations, and, at the same time, to correct the malposition. He attributed the correction of the presentation almost exclusively to the position; a little jogging of the hips occurred, which, he thinks, may have had a slight influence in effecting it. This case occurred in January, 1863. We prefer giving the result of his slight experience, in this mode of treating shoulder presentations, in his own words, to any abstracts we can make. In speaking of the case just mentioned, he observes that: "I did not take to myself any credit for the correction of the presentation in this case, as it was accidental and unexpected, though we were not sorry for the result, and I treasured up the fact in my mind, as well as recorded it in my note-book, from which I now draw the main facts, being determined, if possible, to turn it to account some time, which I did in the following case. On the 6th of February following, the husband of the lady came about ten o'clock at night, saying that his wife was confined, and asked my attendance. But, as I had been up for two or three nights, I advised him to call a medical friend, with whom I had consulted in the case of the prolapsed cord, saying to him, that should any difficulty arise, I would see her with

him. To this he assented, and I went to rest, feeling that she had fallen into good hands, let what would come of it.

"About two o'clock in the morning, I was called by the husband, saying, the doctor would like to see me, as there *was trouble*. The doctor informed me that he had a shoulder presentation, and that the water had drained off. I examined, and found as he had stated, the arm not being down. The doctor, very properly, suggested turning and delivery, but added, as the child was evidently large, it would be lost, as the others had been. On a little reflection, during which I called to mind the case of malposition with prolapsed cord, which I had so recently succeeded in correcting mainly by *position*, I suggested the *possibility* of correcting the presentation in this case by position and gentle manipulation, to which the doctor assented, saying it would do no harm, but thought it would not be successful. But, feeling as I did, a little *special responsibility* in the case, on account of having been previously consulted by the lady, I resolved, with the doctor's consent, to make the effort, which I did in the following manner:

"I had her get upon her knees, on pillows, upon the bed, so as to raise her hips up well from the bed, her chest and face lying flat upon the bed, fetching the back at an angle with it, of about forty-five degrees, the knees being a little apart. I then passed my hand, well smeared with lard, in the vagina, and with scarcely an effort, and without the least complaint or evidence of uneasiness on the part of the patient, crowded back, and, of course, *down*, in her position, the shoulders, and slipping my hand between the brim of the pelvis and the foetal head, I spread out my fingers and brought or directed it, during a pain, to the superior strait, and then, retaining the grasp, we had her turn her hips down carefully upon the bed; when, after a pain or two, the head engaged in the superior strait, and we had a perfectly natural presentation, without having used the least violence, or apparently caused any pain or uneasiness to the patient; and all accomplished, I should judge, within five or ten minutes.

"The doctor, being satisfied with the presentation, I left about three o'clock, A. M., and learned from him that the labor progressed favorably, and terminated at nine o'clock, A. M., or about six hours after I left, the child being a fine, plump boy, of ten pounds, and alive and well.

"Now, the ease with which the hand is passed into the vagina and uterus, with the patient in this position, is wonderful, and will surprise any one that has never made the effort.

"I have delayed reporting this case, except in the Ontario County Medical Society, up to this time, thinking that other cases might present themselves to me, whereby I might more fully test this method of proceeding in shoulder presentations. Such,

however, has not been the case; and, thinking possibly that I might not meet with other cases, I concluded to thus make a plain statement of the facts which led me to the experiment; and also, my firm conviction, from the result of this case, and from philosophical reasoning, that with this *position*, there need, generally, be no difficulty in thus converting a *shoulder presentation* into a *natural* one, and that, too, without necessarily subjecting the woman to any danger, from the slight manipulation required, or to scarcely inconvenience even, thus rendering the life of both mother and child so much more secure than it can possibly be by turning and delivery in the usual way, however skilfully it may be performed. What I have claimed to have *discovered* in this method, is the availability of the position suggested by Dr. T. G. Thomas, for replacement of the prolapsed cord, in the conversion of *shoulder* into *natural* presentations.

1. It is not pretended that this can be accomplished in all stages of labor or conditions of the parts. But that in all *conditions* of the parts and *stages* of labor, admitting of turning and delivery, the presentation may be thus corrected with much less difficulty and with far more *safety to mother and child*. In fact no danger need be incurred in the effort required to thus correct a shoulder presentation, while, to say nothing of the danger of lacerating the uterus in turning, all obstetricians are aware of the danger attending cases in which the feet present or are brought down as in turning, from pressure of the head on the umbilical vein and arteries before its expulsion, producing in many cases, the death of the child from apnea. For the greater *safety of the mother and child*, then, I suggest a trial of this course of proceeding in shoulder presentations. And while I do not believe it can be accomplished without the *position*, which really does most of it, I am confident that with prudence and the exercise of common sense no one need fail with the aid of position in any case, stage or condition of labor, that would admit of turning and delivery. And though the cases referred to may not be sufficient to establish this course of proceeding in shoulder presentations, I do claim, that as the principles are purely philosophical, further *trial* is warranted which may reject or establish the *rules*."*

* Boston Medical and Surgical Journal. Jan. 23, 1868.

CHAPTER III.

FIRST VARIETY OF SECOND SPECIES OF DYSTOCIA.

INSTANCES DEPENDING UPON PRE-EXISTING CAUSES, PERTAINING TO THE WOMAN.

SECTION I.—DEFORMITIES OF THE PELVIS.

IN describing the pelvic deformities page 59, the greater and more important irregularities were treated of in detail, and some of the instances of dystocia accruing from them duly considered. It is our purpose here to speak of other and lesser vices, and treat of other difficulties arising from a faulty condition of this bony canal. In addition to the deformities of the pelvis hitherto spoken of, there may be mentioned the following, *viz.* : 1. An excessive inclination of the spines of the ilia. 2. The symphysis pubes being too projecting. 3. It being of undue length. 4. Too perpendicular a direction of the descending rami, effecting exclusively the inlet. The shape and depth of the cavity may become vicious, 1, by the sacrum being too straight or too greatly curved; 2, by the projection into it of bony tumors; 3, by the presence of nodes or irregularities from illy adjusted fractures of the bones of the pelvis. And the inferior straight or outlet may be rendered faulty: 1, by an elongation of the spinous processes of the ischia, and 2, by an excessive inclination and ankylosis of the coccyx.

It has already been observed that when the diameters of the superior strait are reduced to three inches in the antero-posterior direction and four inches in the transverse, they are at the minimum dimensions that will admit of the escape of a living, well grown child at term. While this deviation from the normal standard does not render labor impracticable by the natural agencies of delivery, it is generally tedious, painful and uncertain. And either of the partial deformities of the cavity or outlet just noticed, is also the cause of protracted and painful labors when present, but when existing in a limited degree, does not necessarily involve the necessity of the interference of art, as the action of the uterus is generally sufficient to overcome such resistance as it may offer.

SECTION II.—OF THE LOCKED-HEAD.

Locked-head is the term applied to a peculiar kind of arrest that the head encounters in its descent through the superior strait.

By some writers it has been assigned a conspicuous position amongst the causes of dystocia labors, while by others it has not been regarded of sufficient importance to entitle it to a separate consideration, but the condition has been considered in other connections without giving it any special attentions.

Locked-head, as defined by Peu, who was the first to notice it, is where the head is firmly held in the passage, between the pubes and sacrum.

De la Motte thus defines it: the head when locked is gripped by the bones of the pelvis, like the keystone in an arch.

Röderer says that in locked-head, the head must be so embraced in the strait, or in the excavation, by every point of its circumference, that a lamina of metal, or the smallest probe cannot be passed between it and the organs in the woman.

Baudelocque describes the head as locked whenever it is fixed at the superior strait by the extremities of one of its diameters, so that it can neither advance under the influence of the natural powers, nor be forced back by the hand of the accoucheur.

Dr. Dewees accepts the definition of Baudelocque.

M. Désormeaux also adopts the definition of Baudelocque, with a slight modification. All modern accoucheurs, who recognize the importance of the condition sufficiently to make it the subject of special consideration, have likewise accepted the same.

Velpeau says of it, without contradiction, it is the most correct, and may be construed as follows: the head is locked in the pelvis whenever two diametrically opposite points of its surfaces are so compressed that it cannot possibly descend under the influence of the expulsive power alone, and when it cannot be pushed up without the greatest difficulty.

Paragromphosis, from $\pi\alpha\rho\alpha$ (*para*), "by," "near," and $\gamma\omega\mu\varphi\omega\sigma\varsigma$ (*gomphosis*), "a nailing." *Paragromphosis capitidis*, wedging the head of the child in the pelvis during labor. This is the literal rendering of the view presented by Röderer, which Velpeau declares it to be impossible to occur.

Madame La Chapell will not even admit the existence of any species of it, the 22,343 cases of labor occurring under her supervision having never presented a single case. She thinks that all that has been written under that title ought to be referred to vicious conformations of the pelvis, to bad positions of the head; or, lastly, to powerful and permanent contractions of the uterus.*

Dr. Dewees says: "In this country, this terrible case is comparatively rare; this is owing principally to the healthy construction of the pelvis of our females. When it takes place, it almost

* Velpeau's Midwifery.

always arises from the bad positions of the head, and these positions must be within the third or sixth, and these as already observed, are of rare occurrence."

We cannot agree with Madame La Chapell in denying the existence of any species of it, notwithstanding her great experience failed to afford her a demonstrative instance. No one familiar with the relative diameters of the foetal head, and the superior strait, can deny the possibility of such an occurrence, even in a normal pelvis, and a head of the usual dimensions, in view of the fronto or occipito-pubic presentations, though practically they must be of extremely rare occurrence, as these presentations are but seldom met with. But where there is a contraction of the antero-posterior diameter of the superior strait, and a head of the usual size, the possibility and even practicability of the occurrence cannot be doubted. In view of deformities of the pelvis favoring the production of the lock-head, we have introduced it in this connection as the most appropriate place to locate it.

Some authors have denominated every form of obstruction of the head at the superior strait, locked-head, and no doubt De Bruyn was influenced by this misnomer, when he avers that he met with eight hundred cases of it in forty years, and also Birkman and Titsing when they quote two hundred and sixty-two cases in nineteen years' practice; while really, the head can only become locked, (technically speaking) by being fixed between the sacrum and pubes, at the superior strait, which must be limited in its contraction to a degree, sufficiently below the occipito-frontal diameter, to prevent its passage, yet large enough to allow a portion of the head to engage in it, under very energetic action of the uterus.

Velpeau admits with M. Désormeaux, that locked-head may sometimes take place in the cavity, where the straightness of the sacrum forms a canal, that diminishes as it descends, and the head in passing down, is arrested in its course, and finally becomes immovable in any direction.

1. *Diagnosis.* Tumefaction of the lips of the os uteri and external organs of generation, and an external swelling of the scalp, and an overlapping of the cranial bones have been regarded as evidence of locked-head, while these appearances may be present, in connection with this occurrence, they are by no means uncommon, in detentions of the head of far less gravity; they cannot therefore be esteemed of much value in determining the exact character of the cause producing them.

The immovable fixedness of the head in the superior strait, or in the cavity, if it should have passed through the inlet, its inability to descend further, under the action of the most energetic contractions, and the equal inability of the accoucheur to dislodge it, by any manual effort he may make to elevate it, settle the question,

as to the kind of detention with which we have to contend. The elongation of the head, during a pain, may cause the apex to approach within a few lines of the vulva, from which it will again recede, as the pain passes off; the head all the while remaining tightly wedged in the passage, at its longest or broadest part, viz.: its occipito frontal or bi-parietal diameter. In order to avoid being deceived by this apparent advanced state of the head, the examination should not be confined to the most pendent part, near the vulva, but it should be extended, by directing the finger posteriorly, and exploring as much of the space as can be reached, both posteriorly and laterally, and thus ascertain the exact point at which the arrest has occurred, and the parts of the head involved in it.

Locked-head may be considered under three degrees of severity.

1. Where the disproportion between the dimensions of the head and pelvic canal, is such only, as to cause a minor grade of locking, that may be overcome by the unassisted powers of the uterus, though not without much excessive suffering, and for a much greater length of time.

2. Where the disproportion is so great, as to require the aid of art to effect a dislodgment, and secure the passage of the head through the contracted pelvis, assisted by the strong and efficient contractions of the uterus.

3. Where the powers of the organism, and the milder resources of art, fail to effect a dislodgment and delivery of the head, but which requires means involving the death of the foetus, and the reduction of its size, as cephalotomy, to consummate its delivery.

The Effects of Locked-head on the Female Organism. It is always liable to result in injurious consequences to the mother, as well as the child. It exposes her organism to inflammation, sloughing, and gangrene; the whole of the soft parts are liable to injury from the long continued and violent pressure which the child's head inflicts upon them; the vagina, rectum, and urethra, sometimes receive irreparable injury. Vesico-vaginal and recto-vaginal fistulae have been known to result from this protracted and severe compression.

Case. The following case, reported by Dr. Agnew, will fully illustrate the effects of protracted pressure upon the soft structures of the woman by the foetal head, during a prolonged labor, incident to locked-head.

"Catharine ——, a young woman aged 19 years, was seized with labor pains, September, 1858, at the Philadelphia Hospital. In consequence of the great size of the foetal head, it became completely impaled (locked) in the pelvic cavity. After ineffectual efforts to deliver with the forceps, the operation of craniotomy was resorted to by Dr. R. K. Smith, Chief Resident Physician, and the child readily removed. In consequence, however, of the prolonged

pressure sustained by the anterior walls of the vagina, a slough, in a few days, separated, opening a communication between that cavity and the bladder, through which the urine flowed. An examination, some weeks after, showed not only the existence of this fistula, but the canal of the urethra closed by inflammatory deposits. A trocar was at once carried through the obstructing material into the bladder, which was retained for eight days, only being removed for the purpose of cleansing. In this manner the urethra was restored."

This case, together with twelve others of vesico-vaginal fistulæ, all resulting from pressure of the head, during protracted labors, extending from thirty-six to forty-eight hours, were successfully operated upon, and permanently cured by Dr. Agnew, between the years 1858 and 1865. In most of the instances, the first operation succeeded, but in a few of them two or three, or even four, were required to perfect the cure. The operation employed by him, is his own, which is a modification of that of Dr. J. Marion Sims, of Alabama.

The bladder also suffers from the accumulation of urine, nor can it be relieved by the catheter, as the canal of the urethra is entirely obliterated, as represented in the foregoing case.

The fœtus, after the rupturing of the membranes, and the escape of the waters, coming under the immediate action of the uterus, and being long delayed in the passage, subject to energetic contractions, becomes so violently compressed that it dies of asphyxia, hence the almost universal fatality attending the fœtus, in cases of locked-head.

The Management of Locked-head. After it is ascertained that the head is immovably fixed in the superior strait, or in the excavation, and the contractions are vigorous and regular, an effort to extract it by means of the forceps should not be delayed. The vigor of the contractions and the completeness of the impactment must be taken into consideration, for if these be perfect, it is evident the fœtus cannot remain long alive; then, with a view of rescuing it, and at the same time affording as speedy relief to the mother as practicable, an early attempt at its delivery should be made. Velpeau cautions against too speedy a resort to the forceps, for the reason that their use may be invoked too soon, and a labor which might in time terminate spontaneously, be unnecessarily interfered with; but if an early application of the instruments will insure the safety of the fœtus, it is better to use them prematurely than to submit to much delay, at the risk of losing it, providing the parts are all favorably disposed.

It is often exceeding difficult in cases of locked-head, where the pelvis is contracted and the head large, or even of the usual size, to introduce the forceps; where the uterine contractions are strong

and have continued for some time, the head becomes so wedged in the pelvis that it is absolutely impossible to pass the clams; and sometimes by the exercise of sufficient skill and strength they may be made to pass, but in so distorted a manner that they cannot be locked; again, they may be passed and readily locked, yet the extraction be impossible from the disproportion existing between the size of he head and pelvic passage.

Where the delivery cannot be effected by the powers of the organism, nor by the aid of the forceps, recourse must be had to cephalotomy.

Various other means have been recommended, in past times, to aid in the dislodgment and delivery of the head when locked, as turning, the vectis, fillet, spatula, etc., etc., but from their frequent failures their use has been entirely discontinued in the present day.

Management of Cases of Deformed Pelves, in the Absence of Locked-head. In slight deformities of the pelvis, either partial or general, the labor may be terminated spontaneously, though not without a proportionate increase of suffering, and length of time occupied in the process. Where the dimensions of the pelvis are not below four inches in the lateral, and three in the conjugate diameters, the head of a living child may be extracted by the aid of the forceps.

Where the measurements are not below three inches and a half in the lateral diameter, and one inch and three-eighths in the conjugate, or three inches in the lateral and one and a half in the conjugate, it is possible to extract the body of a well-grown foetus, after the size of the head has been reduced by mutilation, with the crotchet and other extractive instruments used in craniotomy.

Where the contraction is below the last-named dimensions, the only alternative left, for the relief of the woman, is the Cæsarean section, and this too frequently affords but a forlorn hope.

The foregoing gradation of deformed pelvis, due to Ramsbotham, does not contemplate the destruction of the foetus, while thiere ramains a possibility of its being born alive. Destructive instruments are not to be employed, where the diameters exceed the minimum dimensions capable of transmitting the head of a living child, aided by the use of non-destructive instruments.

Turning, in this degree of contraction, was formerly recommended as a means of relief; but as a successful issue of the expedient is depending upon a combination of so many favorable conditions, under the most propitious circumstances, as concerns the safety of the child, that do not obtain here, that it cannot be regarded in any other light than as a resort to relieve the woman, without reference to the safety of the child, which is not to be regarded as of trifling import, to be placed in needless jeopardy.

Hence, under these circumstances, the forceps have laterally supplanted the operation of turning, as being at once more compatible with the relief of the mother and well-being of the child.

SECTION III.—MALFORMATION, OR DISEASES OF THE GENERATIVE ORGANS.

The vulva-vaginal passage from the external surface of the labia to os uteri, is liable to a variety of malformations, either congenital or accidental, that may seriously interfere with the process of parturition, and render interference necessary.

Instances are occasionally met with, where the labia on both sides throughout their whole extent including the posterior commissure, are in a state of persistent and undue contraction and rigidity, causing much difficulty and delay in the descent of the head through the external opening. This condition is most frequently encountered, where the woman is more advanced in life, before becoming pregnant; hence the delay and tediousness attending the labors of those who have neglected marrying earlier in life. And those who have embraced matrimony much younger are not always exempt from this cause of difficulty; even young women who are inclined to flesh and are of dense fibre, often suffer much during the expulsive stage of labor from excessive contraction and rigidity of the labia and perineum. It often occurs, however, that this condition exists at the commencement of labor, and promises a very tardy and painful process, but as it progresses the faulty parts yield to the physiological action of the organism, and by the time the head approaches the vulva, they become so far relaxed and expanded as to offer no resistance to its passage. When this favorable termination does not obtain, very serious results are apt to ensue, as the uterus contracts powerfully upon the body of the foetus, the head is pressed so forcibly against the resisting parts, as to cause extensive laceration from the posterior commissure backwards, extending throughout the whole, or greater part of the perineum. Instances are recorded where the head has pressed so violently against the centre of the perineum, as to rupture it at that point, to the extent of allowing the child to pass through the unnatural opening. This is a most unfortunate predicament for the woman to be placed in. Where the accident is threatened we are recommended to press firmly against the perineum, with the hand at the point of danger, both with a view of protecting the part, and preventing the further advance of the head, until a sufficient relaxation of the parts take place to permit the head to pass *per vie naturalis*. This event may attend the manœuvre, but not without imminent danger of causing a rupture of the uterus, a disaster vastly more dreadful than that of the perineum. In cases of small, contracted and rigid external

organs, where a rupture to the perineum appears inevitable, it has been recommended by Dr. Michlæis, to incise the posterior commissure, sufficient to enable the head to pass, without incurring the risk of laceration. Eichelbery, where the head is at the vulva, and a perineal laceration imminent, makes an incision on each side of the vulva orifice, by means of Pott's bistoury, just sufficient to allow the head to pass. Where the orifice has been enlarged by these artificial means, enough to permit of the escape of the head, no laceration attends its passage, and the incisions heal rapidly and safely.

Sometimes cicatrizations from previous lacerations, cause great delay and difficulty from their resistance to the necessary relaxation; and where they have not been divided, or relacerated, the foetus has been known to pass through the opening in the perineum. Though mostly tardy in their action, they often become relaxed, ultimately, and allow the child to be born without interference.

The external organs occasionally become the seat of diseases and morbid growths, that interfere with the due process of labor. Phlegmonous inflammation of the external labia, occurring during pregnancy, may cause deep sinuses in the sub-cutaneous tissues, which may continue until labor comes on, and then become the cause of extreme pain, and laceration. And the tracts of previous sinuses, by their rigidity may resist relaxation, and cause delay and increased suffering. If the disease should occur toward the close of pregnancy, every effort should be made to terminate the inflammation by resolution; should it however run on to suppuration, the phlegmon should be freely opened, and the pus discharged, and subsequently dressed for a day or two with a soft emollient poultice, and such a course pursued as to warrant as speedy and perfect a cure as possible.

Lesions of nutrition are not unfrequent, and one or both of the labia may be the seat of warty tumors, which may interfere with the dilating process, and give trouble at the time of labor. We once had a case where both labia and the perineum were entirely covered with a crop of warts. Apprehensive that they might give her trouble in her approaching accouchment, she applied to us at about her seventh month. After examining the parts, and ascertaining their condition, it appeared evident they might interfere materially with their dilatation; accordingly, we determined to remove them. Having placed the patient under the influence of chloroform, we proceeded to clip them off with a pair of sharp scissors, being careful to include the entire dermotic base; the hemorrhage, which was considerable, was arrested by the free use of creosote, over which was placed a coat of collodion. The parts healed immediately, and when labor came on at term, no inconvenience resulted from the cicatrices, some of which were quite large. The warts were never reproduced.

Encysted and fibrous tumors occasionally attack the labia, and

from their non-distensibility, endanger the laceration of the parts. They are circumscribed, and of different sizes; their interference with the passage of the head, is in proportion to their magnitude. When they are larger, and the advance of the head is retarded by their presence, the encysted tumors may be immediately removed by puncturing them and allowing their contents, which is either a semi fluid, gelatinous or caseous substance, to escape. Those that are solid, and of a fibrous character, and from their size obstruct the transit of the head, or jeopardize the safety of the parts by favoring a laceration of them, must be removed at once by dissection. The encysted tumors will reproduce when removed by a simple puncture.

M. Vidal very properly advises the *excision* of *all* tumors of the labia of an encysted or fibrous character, in view of effecting a radical cure. The operation is simple and effectual.

Adhesions of the external or internal labia or of both may be present at the time of labor; these may result from an inflammation of the mucous membrane lining the parts, occurring subsequently to conception. Partial adhesion may also arise from the healing of wounds sustained by the parts. But when they result from such causes they are usually very slight and imperfect, and are capable of being separated spontaneously by the action of the advancing head; when, however, from their firmness they resist the passage of the head, they must be separated by passing a probe-pointed bistoury between the child's head and the adhering labia, and by a single outward stroke divide the seam that marks the line of adhesion.

Congenital adhesion of the labia to a partial extent, is sometimes met with, not sufficiently extensive to interfere with micturition, arrest menstruation or prevent copulation, but enough so to protract and augment the sufferings of parturition by resisting the egress of the head into the world. These congenital adhesions are usually firm and perfect so far as they extend, and if not detected and removed during childhood they now become a serious impediment to the consummation of labor which it requires the use of the knife to overcome.

It sometimes occurs that the development of the hymen is small in extent, but dense and strong in structure; too small to preclude copulation and too strong to be ruptured during the act; under such a state of development, conception can readily take place, and the woman still retain the physical evidence of virginity. Such deviations from the ordinary character of the organ may not interpose any serious obstacle to the functional duties of the parts, until the hour of parturition arrives, when its presence so far diminishes the vaginal orifice as to interfere with the expulsion of the head and render its division by the knife necessary. The records

of obstetrics furnish instances where this obstruction has been overcome by the powers of the organism, and children been born with the hymen remaining entire, thus proving that there is nothing miraculous concerning a child's being born of a virgin. The truth of science should never be prevented from casting its rays of light into the dark chambers of superstition and idolatry. A case is reported by Tolberg that was observed by the elder Mickle, of a woman, who, after having expelled a foetus of five months, surrounded by its membranes, still preserved her hymen intact, circular and tense.

Malformations of the vagina of different kinds, seriously interfering with parturition, are occasionally encountered by the practitioner of obstetrics, which may require the interposition of art to ensure the safety of both the woman and child.

The cavity may be so far reduced in its dimensions, either in part or throughout its whole length, as to be valueless as a channel for the passage of the child. This contraction may occur in any part of the canal, either at the outer or uterine extremity or at the central portion, or it may involve the entire organ. Where the outer extremity is of the normal size, and the uterus and the ovaries are in a perfect state, conception may readily take place; a congenital malformation of the inner extremity with the remaining portions normal, is apt to be complicated with a malformation of the uterus, rendering conception impracticable; this as well as any other degree of deformity or malformation that is incompatible with a conception, does not come within the scope of obstetrical supervision, and hence, is not an appropriate subject for discussion here. Sometimes the walls of the vagina are adhered by bands of variable sizes, distributed at different points along the canal, and constitute very perplexing obstacles to the expulsion of the head. They may extend transversely, obliquely or longitudinally; in the latter instance they may form a complete partition, dividing the vagina into two cavities, either in part or throughout the whole length; when this is the case the septum often extends into the uterus, dividing it also into two parts.

According to Cazeaux, most of the cases of double or triple hymen mentioned by authors can probably be referred to the presence of the transverse bands.

It is almost incredible that pregnancy could take place under the disadvantageous circumstances connected with these malformations of the vagina.

And it is equally incredible that obstruction, connected with malformations of the vagina—that are apparently insurmountable without the free use of the knife—are capable of being so readily overcome by the unassisted efforts of the organism.

M. Moreau observed a young woman, in the fourth or fifth month

of pregnancy, in whom this canal was so contracted, that it barely admitted the barrel of an ordinary writing quill. Such a disposition, which gives rise to much uneasiness, nearly always yields to the natural progress of gestation.*

Portal states that a young girl, in whose vulva there was only a small opening for the passage of the urine, and whose menses were always discharged by the anus, became pregnant, yet the small opening enlarged sufficiently during the latter stages of gestation, and more particularly during the travil, to permit a spontaneous termination of the labor.†

M. Rossi reports that, having been called to a woman in labor, he discovered a total absence of the external genital organs. At first, he supposed there was a retention of the menses, and, under this impression, made an incision about two inches long, in the direction of the vagina, where, instead of the menstrual blood, he encountered a male child, which escaped through this opening, and lived but seven hours after its birth. While searching where the fecundation could have taken place, he discovered, after having interrogated the husband, a small orifice, near the sphincter ani and at the internal part, which would scarcely admit a fine probe.‡

Some years ago, a young married woman presented herself to us for an examination, to ascertain the reason why she was unable to coöperate with her husband, in the performance of his marital duties. The external organs were found to be perfect, but, within an inch of the vaginal orifice, the cavity suddenly degenerated into a small, round opening, only large enough to receive a No. 6 male catheter. This contraction continued up to the os uteri. She never became pregnant, to our knowledge, and, having lost sight of her for several years, the result of her case is unknown to us.

These malformations of the vagina may be congenital, or be the consequence of lacerations, during previous labors, of other injuries, or inflammation of the mucous membrane. Where the band and contractions do not yield spontaneously to the powers of the organism, which they mostly do, after a sufficient time is allowed, they must be removed by an incision.

As we follow up the consideration of the malformations and unfavorable conditions of the generative organs, we next encounter those of the os and cervix uteri. Of these, there are many examples, consisting of simple and spasmodic contractions of the cervix and os uteri, obliquity of the os uteri, tumefaction of the anterior lips of the os uteri, fibrous and scirrhouus tumors, agglutination and obliteration of the os, etc., etc.

* Cazeaux's Midwifery.

† Ibid.

‡ Ibid.

Simple Contraction of the Os Uteri is frequently met with in practice. This is what is usually 'denominated rigidity of the os, which is a passive force, by which the fibres of the os resist the dilatation which they have to undergo. It has been observed and stated by Madame La Chapell, that a rigid os uteri is indicated where the pains in the loins constitute the main suffering of the labor. As it is rather a negative than positive condition, an absence, rather than an excess of action, it may be safely left to the reflex functions of the uterus, unless the resistance continue so long as to endanger inertia of the organ, exhaustion of the patient, or rupture of the uterus. When either of these, or any other mischief is threatened, measures should be taken to induce relaxation, such as the application of the extract of belladonna, or chloroform; and in case these should fail, three or four incisions might be made through the resisting structures. Previously to resorting to this expedient, a lobelia injection may be premised.

Spasmodic Contraction of the Os and Cervix Uteri. This is where the parts are brought under the influence of an active force, and the process of dilatation has progressed to a greater or less extent, and become arrested by a spasmodic action of the circular fibres of the os and cervix, which may continue for several hours, and pass off spontaneously, or yield to treatment. During the existence of the spasm, the os is thinner, presenting a sharp, cutting edge, is warmer, less moist, and more sensitive to the touch than usual. Sometimes this condition immediately succeeds the rupturing of the membranes, either spontaneous or artificial, and during its continuance, the head, or presenting part of the foetus, does not engage in the opening, but the labor is delayed so long as the spasm continues. This delay is attributed, by some writers, to what they term unjustifiable interference in rupturing the membranes prematurely. The sudden escape of the waters may induce the spasmodic action, whether the membranes be ruptured artificially or otherwise; and we are quite certain that we have often overcome spasmodic action of the os and cervix uteri, by rupturing the membranes while the os was in a state of rigidity resulting from it.

A degree of discrimination is necessary to distinguish a spasmodic contraction of the os and cervix uteri, from the simple rigidity of the parts, as above described. Where the os is found partially dilated, and presenting the characteristics just mentioned, the existing rigidity is most probably due to spasmodic action, whether the membranes be ruptured or not, as the dilatation must have proceeded to the extent indicated by the size of the opening, before it was arrested. Should an examination be instituted during the progress of dilatation, the os uteri will be found thick, soft, moist and of the natural temperature. Should the foregoing phenomena present themselves during the course of the labor, the

evidence of the presence of spasmodic contraction would be complete.

It sometimes happens that after the spasmodically contracted os and cervix have so far yielded to the powers of the uterus as to dilate and allow of the passage of the head, they being no longer under pressure of the presenting part, immediately recontract and close in upon the neck of the foetus, and require to be redilated to permit the shoulders to pass. This second dilatation is more difficult to be effected than might be supposed, and a great deal of perplexity is apt to be connected with such secondary contractions.

No temperament, or condition of constitution appears to be exempt from it—the strong and plethoric, as well as the weak and delicate are alike liable to it. In the former cases, venesection has been employed with such great success that it is regarded by many practitioners as a sovereign remedy; but in the latter, its use is contra-indicated. While we have witnessed its beneficial effects in a number of instances, we would suggest that enemata of infusion of lobelia inflata, carried to the nauseating point, if necessary, will often act with greater promptness and efficiency, in overcoming the spasm, than even blood-letting; and it is adapted to every case, robust or delicate. Extract of belladonna, or chloroform, topically applied is a valuable adjuvant to either of the general remedies just mentioned. Emollient vaginal injections, fumigations, baths, etc., are among the means resorted to in obstinate cases, but of their efficacy, in effecting much, there are great doubts.

If a spasmodic contraction of the os and cervix uteri should occur as a complication of some of the serious accidents which render a speedy delivery necessary, or should it continue uncomplicated even, so as to endanger the safety of the woman, three or four incisions, through the resisting structures, should not be neglected.

Obliquity of the Os Uteri. The normal condition of the os uteri, at the commencement of labor, is about the centre of the pelvic cavity, inclined a little backwards. From this it may diverge in four directions, viz.: posteriorly, anteriorly, and laterally, either to the right or left. The posterior obliquity is the one most generally met with in practice; it may be the result of extreme anteversion of the body and fundus, or it may be present when the axis of the uterus maintains its due relation to the superior strait. When this is the case, it will be found that dilatation has not affected the os uteri in all its parts alike, but that the posterior lip is very much more relaxed than the anterior; the rigidity of the latter causes the head to enter the excavation with the anterior portion of the lower segment of the uterus pushed before it, in-

stead of engaging in the os, which is occupying a vertical position in front of the sacrum instead of a horizontal one near the centre of the pelvis. As the uterine contractions increase in force and frequency, the head is forced lower and lower in the pelvis, still carrying the anterior walls of the uterus before it, increasing the oblique divergence of the orifice from its natural position. This state and position of the uterus is favorable to a rupture of that organ at its neck, under the pressure of very severe contractions.

This malposition of the os uteri is often very perplexing to the young practitioner, who, expecting to detect it in its normal attitude, is surprised to find that his examining finger encounters nothing but a hard, round, solid tumor, presenting nowhere on its surface any indication of the presence of an opening; and very grave mistakes have been perpetrated, under the impression that such were cases of imperforations of the uterus. And instances are recorded where artificial openings have been made through the uterine structures, with a view of liberating the foetus; while the natural orifice, in a state of partial dilatation, from its oblique position, escaped the search of the examiner, and thus betrayed him into the commission of this very serious blunder.

Labors occurring under such circumstances are often prolonged several hours, but the action of the uterus finally overcomes the obliquity, and the head engages in the orifice as though no derangement of position had occurred. The process, however, may be greatly accelerated by an artificial adjustment of the os uteri. This is effected by passing the finger high up behind the most pendent part of the presenting tumor, where the rigid anterior lip of the os uteri will be found, with the more relaxed posterior one separated from it, leaving the mouth partly opened. The finger must be inserted into the orifice, and it hooked down to its normal position, near the centre of the pelvis, where it must be retained during the continuance of two or three contractions; the pressure of the head fairly upon the os will so modify the dilatation as to allow the head to engage in it, after which the labor will progress in the usual way. From the imperfect dilatation of the anterior lip, as the head is propelled down through the pelvis, it is often carried down very low, by the descending part, even to the verge of the vulva, which tends to protract the labor considerably. In such cases the os is not sufficiently dilated to permit the parietal protuberances to pass readily, hence the anterior half of the orificial boundary is found enclosing the posterior part of the head until it arrives beneath the arch of the pubis. The delay arising from this cause, may be effectually obviated by pressing against the anterior lip, with one or two fingers, as soon as it can be conveniently reached, in the absence of the contractions, and sliding it

over the occipital protuberance; sometimes several efforts will be required to complete this manœuvre. After the head is once cleared of the os uteri, the labor will progress much more rapidly to its termination.

Tumefaction of the Anterior Lip of the Os Uteri. It occasionally occurs, that in consequence of the imperfect dilatation of the anterior lip, it is carried down before the head, and compressed between it and the symphysis pubes, which very materially augments the sufferings of parturition, and if sufficiently prolonged, becomes contused and tumefied. This is more apt to occur when the pelvis is below the normal dimensions in the utero-posterior diameter. M. Blot mentions a case in which the tumor was an inch and a quarter in thickness, and forced down to the vulva. The labor had to be terminated by the forceps. Duclos describes one that came under his observation, as being cylindrical and projecting four fingers' breadth beyond the parts; it was two inches broad near the vulva, irregular, resistant, and of a wine color. These tumors are often excessively painful, especially when they are subject to long continued pressure, and result from extreme contusion. The pain and tumefaction generally disappear promptly, after the termination of the labor, which they seldom prevent taking place spontaneously, leaving nothing for the accoucheur to do by way of facilitating the process. When the tumefaction is great, of a dark color, and threatening gangrene, it should be punctured in a number of places, that the infiltrated fluids may escape, and the size be diminished.

Fibrous and Scirrhous Tumors of the Cervix and Os Uteri. Here are two forms of morbid growths, differing essentially in their character, their consequences, and their terminations, but which are identical in their effects on parturition. The former have but little or no influence upon the constitution from the peculiarity of their structure, but the effects of which are principally mechanical; which do not ulcerate, and are not malignant. They very seldom attack the os or cervix uteri, but more generally the body or fundus.

The latter are destructive to the constitutional energies, ulcerate, are excessively malignant, and fatal in its termination. A genuine scirrus is unamenable to treatment, and degenerates into an open cancer.

Cancer in its primitive or scirrhous stage, like a fibrous tumor, is hard, solid and unrelaxing, either of which when situated upon the cervix or os uteri, must necessarily impede the process of labor in proportion to the extent in which the parts are involved. A fibrous tumor may be attached to the cervix or os by a pedicle, much smaller than the body of the growth, or it may be united by a broad base, involving the entire thickness of the structures. A

scirrhou*s* tumor consists of a hardening and induration of the cellular substance of the parts affected, and the base is the broadest part of it. When either of these morbid growths is small and implicates but a small portion of the orifice, the unaffected part will dilate sufficiently to allow the head to pass without any serious difficulty. Where it is greater, and the dilatation of the os less perfect, in consequence, the delay and suffering attending the expulsion of the head, are correspondingly increased. Where one lip, the posterior, is wholly implicated, and consequently undilatable, and the pelvis large, the normal one may dilate sufficiently to allow the head to escape, but not without great delay and excessive pain.

Where the whole of the os, or the entire circumference of the neck is included in the diseased mass, and insusceptible of dilatation, the morbid structures must be divided by making several incisions through their entire extent. This is the only available resource afforded by our art in those extreme cases. Delivery by turning, or the forceps, is utterly impracticable, except where the bistoury has previously facilitated an entrance to the uterus; then where the organ has become exhausted by long continued and severe efforts, either of these expedients may be resorted to according to the state of advancement of the labor, and the position of the head. Cephalotomy would be valueless in this undilated and undilatable state of the os uteri; and the Cæsarean section would be unjustifiable, when the less hazardous expedient of incising the periphery of the diseased os, will afford the requisite means of relief.

The prognosis of cancer of the uterus is unfavorable to both mother and child. Puchelt reports twenty-seven cases of labor, complicated with cancer of the os and cervix uteri, five of whom died during labor, and nine shortly afterwards. Fifteen of the children resulting from these labors were still-born.

The effects of parturition upon a cancerous os or cervix uteri is disastrous, whether the tumor be incised or not; the pressure to which it is exposed, during the expulsion of the head, augments the morbid action and hastens its development; and this result appears to be no less certain, even where the labor has terminated without any assistance whatever.

Morbid growths implicating the body and fundus of the Uterus. These include all undistensible, non-contractile growths of undue density and resistance that may invade the structures of the body and fundus of the uterus, whether malignant or non-malignant. They come under consideration here, only in so far as they relate to gestation and parturition. Those that are most frequently encountered are the fibrous tumors, though the scirrhou*s* or malignant ones may occasionally be met with; these, however, more usually attack the os or cervix. Women are seldom subject to those fibrous growths under forty years of age. Sir C. M. Clark has never met

with them in females before the age of twenty years. The scirrhouss tumors also are most frequently met with after the middle of life, but we have seen a case of cancer of the uterus of which the patient died in the twenty-second year of her age, a preparation of which is preserved in our University Museum.

The fibrous tumors may be imbedded in the uterine parietes by a broad base; or they may be attached by a pedicle just beneath the serous or mucous membrane, in the former case they will extend externally, and in the latter internally, into the uterine cavity, diminishing its capacity in proportion to their magnitude; their shape which is modified by the pressure of the parietes will correspond with that of the cavity.

The presence of morbid growths in the substance of the uterus, when the Fallopian tubes are not involved, may not prevent conception, yet utero-gestation is very apt to be interrupted at the third or fourth month, resulting in abortion, probably from the inability of the parietes to distend, or from the imperfect circulation occasioning inefficient nutrition.

Dr. Ingleby remarks: "A tumor imbedded within the proper tissue of the uterus, but not implicating the Fallopian tube, does not prevent impregnation; thus fibrous diseases and pregnancy are frequently combined." "In the unimpregnated state the existence of a tumor of moderate dimensions may not even be suspected; but when associated with pregnancy the increase it then undergoes will probably lead to its detection. It either remains tranquil throughout pregnancy and escapes notice, or the passive state merges into sub-acute inflammation, the substance being painful when examined with the hand or subjected to accidental pressure. The constitution participates in the excitement, as denoted by deranged gastric and intestinal functions, increased frequency of the pulse, and more or less emaciation. These symptoms soon yield to judicious treatment, comprising the application of leeches, the recumbent posture, (reposing on the back or side opposite to the tumor), the moderate use of anodynes, the regulation of the bowels by very mild means, the tepid hip-bath, and a spare unirritating diet. In subsequent pregnancies, the tumor rarely enlarges in the same ratio and occasions but little comparative inconvenience."

When labor comes at term, in the presence of morbid growth, embedded in the uterine structures, parturition may be rendered difficult and protracted, from incomplete contractions, and during the labor, and especially after the expulsion of the child, the danger of hemorrhage will be imminent from the same cause.

Instances of rupture of the uterus have been referred to imperfect and partial contractions, caused by the existence of tumors in the tissue of the organ.

When from the prevalence of symptoms previously to conception,

or during gestation, or manifesting themselves at the time of labor, the accoucheur is led to believe that the uterus is infested with such morbid growths, he should not withhold the interposition of his art, but by turning or the forceps hasten delivery as rapidly as his judgment and the well-being of the patient may demand. The subsequent hemorrhage must be combatted by the means already recommended in such cases.

Agglutination and Obliteration of the Os Uteri. Naegèle describes a condition of the os uteri of very unusual occurrence, viz.: an agglutination of the outer edges of the orifice which presents upon examination the semblance of an imperforate os uteri; the inferior segment of the organ is found low down in the pelvis in the early part of the labor, presenting a slight indentation, which has the appearance of being entirely closed by a filamentous web-like structure in the middle of the depression; sometimes the lips are agglutinated by a tenacious, gluey mucus, of more than ordinary consistency. As the contractions increase in energy, and the pressure of the head against the inferior parietes becomes greater, this web-form aponeurosis gets proportionately thin, so much so, that it feels like the membranes between the finger and presenting part. It is rather unaccountable that so attenuated a structure should be able to resist the powerful uterine contractions so long, and finally be required to be overcome by artificial means. This agglutination is supposed to be the result of previous inflammation, and the pseudo-membranous expansion to be analogous to the accidental adhesions that are found existing between other structures resulting from the same cause, as adhesions of the pleura, peritonum, etc.

Another form of agglutination is sometimes met with, that gives rise to some perplexity with the inexperienced practitioner. It is a similar condition existing at the edges of the os uteri, where the membranous structure is attached all around its inner border, and which is susceptible of a degree of expansion. We witnessed a case of the kind some time ago, where the abnormal formation was at first taken for the presenting membranes. The os was dilated to the extent of an inch in diameter, but the finger could not be introduced within the circle, for all the way around the entrance was effectually guarded by this adhering structure, which presented to the feel an exact similitude to an imperforate os. The real state of the case was not ascertained until revealed by the speculum.

Notwithstanding these aponeurotic pseudo-membranes resist the energetic contractions of the uterus, they readily yield to a slight force applied by the finger. Any other instrument is seldom needed to break down the obstacle they interpose to the spontaneous termination of the labor.

An imperforation of the os uteri, is a condition of more rare oc-

currence even than the agglutination, yet it is occasionally encountered at very distant intervals, and in localities far asunder. Its extreme rarity should govern the practitioner in regard to his diagnosis, as other conditions may be easily mistaken for it. A posterior obliquity of the os, or of the whole organ, anteriorly, may cause the orifice to ascend so far up in the posterior section of the pelvis, as to be out of reach entirely, leaving for exploration only the anterior walls of the uterus, carried down before the advancing head into the cavity of the pelvis. Agglutination of the os may also be mistaken for an imperforation. It is possible for the two lips to overlap each other so effectually, as to mislead the practitioner into an error in regard to his diagnosis. This state of the os has been mistaken for an absolute obliteration.

Dugès says: "Several times we have found the anterior lip covered and embraced by the posterior one, which thus masks the opening so that the finger could not penetrate it in a very oblique direction; though, when effected, this introduction furnished a means of rectifying the error promptly, and of reducing the parts to a more favorable state.

A complete obliteration of the os, when certainly detected, evidently demands the interference of art; an artificial os uteri, formed by making an incision through the uterine tissues, at a point in the presenting tumor corresponding to the natural position of the os, at the same stage of an eutocial labor, promises the only chance for the delivery of the child by the natural passage. The incision should be sufficiently large to allow of the exit of the child. The operation is not a difficult one; neither is it attended with much danger, nor a great amount of hemorrhage. This operation is called by some, we think erroneously, the vaginal-Cæsarean operation.

SECTION IV.—OBLIQUITY OF THE UTERUS.

The axis of the gravid uterus is liable to deviations from its normal relations to the axis of the superior strait. These are known as obliquities of the uterus. There are three oblique directions that may interfere, to a greater or less extent, with parturition. These are the anterior and right and left obliquities. The posterior obliquity, or retroversion, is a displacement incident to the non-gravid state, and to early pregnancy; but, after the organ has ascended out of the pelvis, and at term, the posterior obliquity is obviated by the spinal column, which prevents the body from receding backwards; and the lateral deviations cannot be so excessive as to interfere, materially, with the process of labor, because of the resistance offered by the lateral abdominal walls to the right or left inclination. The anterior obliquity is sometimes

so great, as to cause several hours delay in the progress of the labor, and gives rise to much additional suffering. It is marked by an unusual anterior prominence of the abdominal tumor, and a corresponding posterior inclination of the os uteri, which is sometimes elevated as high as the sacro-vertebral angle, or near it. This displacement is liable to be confounded with the posterior obliquity of the os, which mistake should be sedulously guarded against, as the means adapted to the adjustment of the one is not appropriate to the correction of the other.

A relaxation of the muscles, constituting the anterior parietes of the abdomen, favors an anterior obliquity of the uterus; as the organ increases in size, and augments in weight, during gestation, the resistance offered by the anterior abdominal muscles is not sufficient to prevent its undue inclination forwards; and as pregnancy advances, the obliquity becomes more and more decided. Those who have borne many children, are more liable to the displacement, though those in the first pregnancies are not wholly exempt from it.

When a severe anterior obliquity is encountered at the commencement of labor, the indications are, first to restore the uterus to its normal position, and secondly, to retain it there until the presenting part of the foetus engages in the os.

These can be effectually met, by directing the woman to assume the recumbent attitude on the back, at first, with the hips elevated. While in this position, the uterus should be pressed gently but firmly upwards and backwards with the left hand, and with the index finger of the right, inserted in the os uteri, it should, at the same time, be hooked down into the centre of the pelvis, and held there during three or four contractions, after which it will not be likely to resume its malposition; and to further guard against which, the woman should remain on the back until the os becomes measurably dilated, and the head has commenced engaging within it. While this manœuvre is being practiced, the woman should be enjoined to suspend her voluntary efforts; and the absence of pain should be the time selected for action.

The following case, reported for the *University Medical and Surgical Journal* of July, 1864, will afford a good idea of the management of a case of extreme anterior obliquity of the gravid uterus at term.

Mrs. J — B —, aged 18, *primipara*, a short and slender woman, was taken in labor on Monday evening, May 2d, 1864, about five o'clock. Had regular pains all night. On the morning of Tuesday, the 3rd, called in her medical attendant. He visited her several times through the day, and in the evening brought with him a medical friend to see the case. Gave her encouragement from time to time, by telling her she was making due progress. At one

time she was told that the mouth of the womb was open the size of a quarter of a dollar, and subsequently, that it had increased to that of a half dollar, etc. He and his friend left, with instructions that, if his services should be needed in the night, she must send for him. Her sufferings, then, were such as to induce the belief that if his services were of any value to her, she badly needed them at that moment. She was told that the child could not be born without instruments, and that the time for using them had not yet arrived. After giving her this information he retired. Alarmed at this unwelcome intelligence, she resolved to seek elsewhere for assistance. She accordingly sent him word that he need give himself no further trouble, as she wished to dispense with his services. About nine o'clock on Wednesday morning, the 4th, Sarah Caldwell, M. D., her next door neighbor was called in, who found her in great mental and physical agony; and alarmed at her situation; her pains were very strong, and came on in rapid succession. Upon examination, she found the head about engaging in the superior strait, carrying the inferior portion of the anterior uterine walls before it. Upon examining the abdominal tumor externally, she found present an extreme anterior obliquity. Guided by this observation, she renewed the search for the os uteri, in the posterior part of the pelvis, as high up as the finger could reach, but to no purpose.

She remained with her during the day and night. Her pains continued severe and regular, with but very little advance of the head. On Thursday morning the 5th, her strength evidently failing, and the pains becoming weaker, and occurring at longer intervals, she obtained the consent of the patient to send for us; we arrived about ten o'clock, A. M. After receiving the foregoing history of the case, we instituted an examination, to ascertain, if possible, the position and condition of the os uteri; it was found up in front of the promontory of the sacrum, and only sufficiently dilated to admit the point of the finger, and very rigid. The woman was placed upon her back, with the hips elevated; a very small quantity of belladonna ointment, prepared impromptu, by rubbing up some tincture with lard, was applied to the os uteri, when it yielded beautifully, and in less than ten minutes, was entirely relaxed. Two fingers were now introduced into it, by which it was drawn down to its normal position, while, with the other hand, the uterine globe was carefully pressed upwards and backwards; the os was retained in position without assistance, the patient remaining upon her back. The pains rapidly grew fainter and farther apart, from the exhausted condition of the uterus.

Powdered ergot, grs. xv were given. In half an hour a perceptible increase in the force and frequency of the contractions was observed, which was encouraged by titillation and friction of the

inner surface of the os uteri, from time to time, for two or three hours, when the pains became vigorous and propulsive. The head fully engaged in the os uteri, entered the superior strait, and at five o'clock in the afternoon, the child was born without the aid of instruments. The child was apparently lifeless, but a brisk pulsation of the funis gave encouragement to make prompt efforts at resuscitation, which proved successful. In due time we left our patient, after her long and tedious travail of seventy-two hours, the happy mother of a live and vigorous boy.

Moderate cases of anterior obliquity, very often become adjusted spontaneously by the unassisted powers of the uterus. We have frequently known labors to terminate favorably, without assistance where the os uteri was quite considerably elevated anteriorly to the sacrum, both from a posterior obliquity of the os and cervix, and an anterior inclination of the body and fundus. Valpeau describes a very curious case as follows : " I ought in this place to mention a kind of deviation that I have never met with but once, of which I have been unable to find any cause described by the various authors, and which ought not to be confounded with anterior obliquity. In a woman who came to be confined in my amphitheatre in the month of May, 1828, the fundus of the uterus was rather inclined backwards than forwards ; the head of the foetus formed above the strait a considerable projection, which descended nearly to the vulva, and was at last situated in front of the symphysis pubis ; the os uteri, which was on a level with the superior strait, seemed to be scoped out of the substance of the superior walls of the womb, which made it longer behind than before. In order to reach the orifice and penetrate towards the head of the child, I was obliged to bend my finger so as to make it pass almost horizontally above the pubis. Such a state of things surprised me, and I mentioned it to the students, who easily satisfied themselves as to its existence. The progress of the labor was so much retarded by it, that after seven hours of pains and pretty strong contractions, the os uteri, although very soft and very dilatable, was scarcely opened at all. M. Désormeaux, whom I invited to see this remarkable case, said that he had never noticed one like it, and agreed with me that by means of position and the assistance of the hand properly combined, I ought to try to carry the head to the centre of the superior strait, by making it slide from below upwards and from before backwards over the pubis. I began to execute this manœuvre at half past eight o'clock, and continued alternatively with several of the students until nine o'clock. From this time there was no longer a tumor in front of the symphysis, and the labor progressed so rapidly that in less than an hour the child was born and the placenta itself expelled."

Such a state of things seems to depend : 1st, on a posterior inclination of the womb ; 2nd, on the inclination of the superior

strait; 3d, on some deviated position of the foetal head and, perhaps, upon the thickness, or the unequal density of the walls of the womb; to this displacement should be referred the position described under the name of *sur-pubal* by Madame La Chapell and M. Dugès.

SECTION V.—STONE IN THE BLADDER.

Though the presence of vesical calculi, is by no means unusual, its complication with pregnancy and parturition is of a rare occurrence, yet there is nothing in either of these conditions unfavorable to such a complication, and its rarity is due, rather to accident, than any physiological modification the system may undergo from gestation. Sometimes, small particles proceed from the kidneys, which form nuclei for the vesical calculi, but most commonly the formation is commenced in the bladder itself.

The chief signs that lead us to suspect their existence are a sense of weight in the perineum, and sometimes of a rolling when the patient changes position; frequent desire to pass the urine; sudden stoppage to its flow; and bloody urine. We cannot, however, be certain of this without sounding the patient. When too large to be expelled by the urethra, they remain in the bladder, causing its disorganization unless removed by surgical operation.

If the presence of a calculus, of any considerable dimensions, be detected in the bladder during pregnancy, its removal by any of the means resorted to in surgery, may be of questionable propriety.

The shock communicated to the system by such an operation, even the milder one of crushing, may be such as to endanger the continuance of gestation. While if the stone be allowed to remain in the bladder until the approach of labor, the consequences may prove equally disastrous to the safety and well-being of the patient.

If the stone be large enough to shorten the antero-posterior diameter of the superior strait materially, when situated between the symphysis pubes and the head of the foetus, a position it is liable to attain, by being pressed down by the advancing head, it begets the necessity for the operation of cephalotomy, as certainly as a deformity of the pelvis would, by which the conjugate diameter of the strait, might be shortened to the same extent.

By the severe compression, to which the neck of the bladder and anterior vaginal walls are subject, between the calculus and the head, the danger of extreme inflammation is rendered imminent, which may terminate in ulceration, and result in that bane to woman's comfort, a vesico-vaginal fistula.

To avoid the deadly operation upon the foetus, and the terrible consequences of this situation of the stone upon the woman, it has been recommended to cut down through the vaginal and vesical structures, and extract the stone by the vagina. This expedient

cannot be resorted to, without incurring the risk of producing a fistulous opening between the bladder and vagina.

With both sides of the question before him, the practitioner is left to exercise his own judgment in reference to the course to be pursued.

When the presence of the stone is detected before the head has progressed so low as to press it down between it and the pubis, it must be pushed up, and kept out of the way until the head has so far engaged in the superior strait as to prevent its descent into the pelvic brim.

SECTION VI.—CHRONIC DISEASES, AS ASTHMA, PHTHISIS, DROPSY, ETC.

In the course of general obstetrical practice, the accoucheur will be liable to encounter complications of labor with chronic diseases of the gravest character, in the management of which the exercise of great skill and judgment will be required. All diseases of the chest that interfere with respiration, as asthma, hydrothorax, hydrops-pericardium, etc., are among the maladies that render the parturient function very precarious and hazardous. Gibbosities or curvatures of the spine, where they render respiration difficult, by restricting the expansibility of the chest, are also of serious import when complicated with labor.

The most that can be done for the relief of the woman, under such circumstances, is to allow her to enjoy what position she may find most compatible with comfortable respiration, to request her to withhold all voluntary efforts, and leave the work of propulsion and expulsion to the unaided contractions of the uterus; and as soon as the state of the parts, or the advancement of the labor will admit, to hasten its termination by turning, or the use of the forceps.

Sometimes women far advanced in phthisis, are required to yield the waning powers of their system to the imperative demands of parturition; and it has been a matter of astonishment to the practitioner, to witness the tenacity with which they cling to life, during these seasons of travail, and how the remaining vital energies seem to be concentrated and exerted to consummate this grand finale of the reproductive design. Instances are recorded where they have patiently and heroically borne their sufferings throughout the painful process, and then expired, bearing with them the joys of maturity, induced by their infants' first cries, to the peaceful shores of the bright summer-land.

Where the system is enfeebled by this, or any other disease, the strength, usually applied to maintain the voluntary efforts, should be saved. All straining, therefore, must be interdicted, and the

burden of the labor be referred to the spontaneous action of the uterus.

As soon as the state of the parts will permit, the labor should be terminated artificially. In cases of extreme physical debility, waiting for a reasonable time for the head to descend into the cavity of the pelvis, a position favorable for the application of the forceps, would be more economical of strength, than to resort to the exhausting operation of turning, even at an earlier period, and at the same time, it would be more compatible with the safety of the child.

Ædema of the Labia. Should the distention of the labia from this cause be so great as to interfere with the passage of the head, at the birth of the child, they should be punctured or scarified. This expedient may be resorted to in anticipation of labor, in case other means employed to reduce the tumefaction fail, and it be such as to threaten difficulty. The operation has frequently been resorted to, and there appears to be no danger attending it. Mauriceau has known œdematos labia attacked with erysipelas, which proved fatal after delivery. Such occurrences, however, are seldom; the disease usually disappears entirely, immediately after the birth of the child.

In connection with hydrothorax and hydrops pericardium, we would invite a moment's attention to ascites, or dropsy of the abdominal cavity, as a complication of labor; although many women, most seriously affected with ascites, pass through their travails with almost as much convenience and comfort as others do who are in perfect health. Velpeau mentions the case of a woman, whom he saw in 1824, who was laboring under ascites, and who had been tapped thirty-six times, and who was, notwithstanding, delivered very naturally after a labor of a few hours' duration. Another, who came under his notice in 1826, who had been dropsical for four years, and whose labor lasted only two hours, although her abdomen was enormously large, and although from ten to fifteen litres (litre, nearly a quart,) of fluid had been several times drawn off from the belly by tapping.

Notwithstanding such marvelous cases are occasionally met with, it is well known that from such excessive distention of the abdominal muscles, they must be proportionally weakened, and separated from each other, diminishing to a great extent their power of rendering assistance during the propulsive and expulsive stages of labor, when it is most needed; because in this condition of the system, induced most likely by derangements of the circulatory system, and an impaired condition of the blood, the powerful unaided action of the uterus might excite dread of asphyxia, or, at least, might be followed by a dangerous or fatal collapse, hence the interference of art, either by turning or the forceps, whichever may be indicated, is demanded.

In all cases of chronic diseases, where labor is so far complicated as to seriously interfere with the normal process, or endanger the safety of either mother or child, the beneficent resources of art must not be disregarded, nor too long delayed.

SECTION VII.—ANEURISM.

This consists of an enlargement of an arterial trunk, induced by a diseased condition of the inner and middle coats of the artery, which results in a dissolution of continuity of the structure diseased, leaving the external coat only entire, which becomes distended by the accumulating blood, and forms a sack or pouch, that gradually increases in size, until, from the extreme tenuity, it finally ruptures, causing death from hemorrhage, unless it previously yield to treatment, or to the *vis medicatrix naturæ*. It is universally acknowledged to be a very formidable and dangerous calamity, usually defying all the powers of the healing art.

None of the arterial trunks are exempt from this condition, it may occur in those of the cavities as well as the more exterior ones. The order of frequency in which aneurism occurs in different arteries is said to be as follows: first, the aorta; second, the popliteal artery; third, the femoral artery in the groin; fourth, the carotid; fifth, the subclavian; sixth, the axillary; seventh, the external iliac; eighth, the innominatum; and occasionally in other arteries.

The dangers of aneurism, during labor, are materially augmented by the contraction of the muscles, and the impeded or repulsed circulation, in the affected artery, consequent thereupon. This aberration, in the usual course of the circulating fluid, causes greater tension upon the attenuated structure, and favors a rupturing of the coat, at probably a much earlier period than it would have occurred under ordinary circumstances.

Where there are evidences of an aneurismal tumor on one of the large arteries, traversing either of the cavities, little more can be done than to require the woman to restrain entirely her voluntary efforts, and endeavor, as soon as possible, to empty the uterus, after the parts have attained a favorable condition, either by turning or the forceps. But where disease has assailed one of the more external arteries, and the presence of the pulsating tumor is appreciable to the senses, not only should the foregoing means be employed, but additional safety may be derived from the application of moderate and uniform pressure to the part; this is effected by placing a smooth compress over the tumor and confining it thereby by a properly adjusted bandage, made moderately tight; the object of this appliance should be more to support the part, and guard it against the effects of muscular contraction, than to compress it into small space.

SECTION VIII.—BONY, FIBROUS OR OTHER TUMORS IN THE PELVIC CAVITY EXTERNAL TO THE GENITAL CANAL.

The pelvic cavity may be occupied by tumors connected with either the osseous or soft structure, which may so far interfere with the process of parturition as to render the interposition of art necessary.

Those of the bony tissues are of two characters, mainly, though a variety of them have been enumerated, all of which may be referred to one or the other of the two leading ones, so far as their qualities are concerned.

Exostosis, from $\epsilon\xi$, (ex,) *out of*, and $\sigma\tau\epsilon\omega\nu$, (osteon,) *a bone*—out of a bone. Exostosis is the name given to certain bony tumors, that form, or grow out from the surface of bones, or in their cavities. They are sometimes distinguished into *true* and *false*. The former seems to be a projection of the osseous substance, and to have the same organization and hardness as that substance; the second is denominated *osteo-sarcoma*, from $\sigma\tau\epsilon\omega\nu$, (osteon,) *bone*, and $\sigma\alpha\rho\xi$, (sark,) *flesh*—disease of the bony tissue, which consists in a softening of its laminæ, and their transformation into a fleshy substance, analogous to that of the cancer. All hard bony tumors are but varieties of the first, and the soft ones of the second species. Undue internal projections of the sacro-vertebral angle have been mistaken for exostosis. Nevertheless, this point may be the seat of the genuine tumor, as well as the last lumbar vertebra, and the first division of the sacrum. They may also spring from the posterior surface of the pubis, from any point of either of its rami, or from any part of the inner surface of the ischia. Tumors situated at the sacro-vertebral junction, or upon either of the bones contributing to it, or upon the posterior face of the pubis, diminish the length of the antero-posterior diameter of the superior strait, in proportion to their size and exact locality; whilst those on the sides of the ischia diminish the lateral diameter of the outlet in the same proportion.

Some difficulty attends the diagnosis of exostosis at the posterior boundary of the superior strait, as they are liable to be confounded with an anterior projection of the sacro-vertebral angle; and without due care, they may be complicated with fibrous tumors, occupying such localities as they are liable to infest. Their utter immobility and bony hardness are characteristics that distinguish the *true* exostosis from any other variety of tumors, while the cancerous symptoms that characterize the *false*, are its principal distinguishing marks. The derangement of the relative position of the different viscera of the pelvis, and the deformity imparted to indi-

vidual organs by being pressed upon by the existing tumor, will also afford important additional diagnostic marks. The rectal as well as the vaginal examination must be employed, in making out the diagnosis; for if the tumor be situated in the posterior part of the pelvis, the posterior wall of the rectum will be pressed anteriorly, and the normal shape of the organ be deformed, by the hard immoveable mass behind it. The value of this sign is enhanced, by the fact, that these bony tumors are mostly located in the anterior half of the pelvis.

Illy-adjusted fractures of the pelvic bones, and excessive osseous deposits at the points of fracture, have been known to be the cause of dystocial labors, from the irregularities and obstructions they present.

Exostosis may result from syphilis, scrofula, rickets, gout, etc. The management indicated in dystocia resulting from the presence of bony tumors in the pelvic straits, or cavity, must be regulated by the size and position of the intruding obstacle. A small bony tumor, so situated as not to interfere materially with the diameters of the straits, may not prevent the spontaneous conclusion of the labor; while, on the other hand, the obstruction may be such as to require turning, or the forceps, and even cephalotomy or the Cæsarean operation.

Fibrous and other Tumors in the Pelvis, involving the Soft Structures, exterior to the Genital Canal. Fibrous or scirrhouus tumors situated at the upper part of the excavation, or even above the superior strait, implicating the ovary, intestines, epiploon, or other structures, sometimes give rise to considerable trouble, when sufficiently movable so sink down between the uterus and the bony walls of the cavity, and large enough to obstruct the descent of the foetus. When they are compressible, and capable of being flattened out, and not too large, they may not prevent the unassisted birth of the child, though the labor may be delayed a long time, and the sufferings greatly augmented. Where the size and hardness of the tumors will not admit of the descent of the foetus, but cause a complete arrest of the process, by mechanical obstruction, an effort must be made to elevate the tumor above the brim of the pelvis; the success of this effort will depend materially upon the position selected, for the woman to occupy, while the attempt is being made; for this purpose the back has been recommended by some, and the side by others; in either case the hips are directed to be elevated; but the posture that affords the greatest facility for effecting this object, is upon the knees, with her head upon the bed, the same as recommended by Dr. Gaillard Thomas, for the reduction of prolapsus of the cord, and Dr. Edwin R. Maxson, for correcting shoulder presentations. The position that elevates the hips the most, and relaxes the abdominal muscles the most thoroughly, is the one

most favorable to the reduction of the tumors. After the woman has been thus arranged, longitudinally with the bed, and near enough the edge, to be convenient to the hand designed to be used by the practitioner, the attempt must be made to push the mass effectually above the brim of the pelvis; the most propitious time for this manœuvre, is during the absence of pain. Should this endeavor fail to accomplish the object in view, we should next resort to the extraction of the tumor, by making incisions through the walls of the vagina or rectum. Should this expedient fail to promise success, cephalotomy, or even the Cæsarean section, must be resorted to, in view of affording the woman a chance for her life.

Tumors of various kinds as *sarcomatous*, scrofulous, fibrous, etc., that are found occupying the cellular structure of the pelvic cavity, from their immobility, where large and incompressible, are more annoying to the practitioner, and dangerous to the patient, than those just considered, because they prevent the descent of the head; and the tissues by being long subjected to severe pressure, are liable to contusions, resulting in inflammation, sloughing, etc., of the structures involved, causing fistulous openings into the adjacent cavities, and other distressing consequences; while the uterus is by no means free from the danger of laceration, from its violent contractions upon an immovable body, or inertia; nor the patient from general exhaustion, from excessive and protracted suffering.

Where the use of the forceps is not practicable, and the morbid growth is too extensive to allow of the passage of the body, after a mutilation of the head, recourse must be had to the Cæsarean operation, unless the removal of the tumor by extraction promises to be less dangerous than the latter.

The recto-vaginal septum and perineum are often the seats of tumors of various sizes, and characters. Those infesting the former locality are simply the incysted tumor, only requiring to be punctured through the vaginal or rectal walls, to allow the contents to escape, and the size to diminish so far as to be compatible with the convenient passage of the fœtus. In consequence of the certainty of the reproduction of the tumors, after having been removed in this manner, it is recommended by some to extract them, including the sack or cyst that secretes and contains the fluid or other substance, to which their size is due; but as a simple puncture is sufficient to reduce the bulk, so that the fœtus can pass readily, the present indication is fully met, and the employment of means for effecting a radical cure, can be deferred until conditions are more favorable for such an attempt.

Those found in the perineum, of a scirrhouss or fibrous character, from their non-distensibility, give trouble in proportion to their size, or the space occupied by their base. When not large, which is most frequently the case, their interference with labor is not very

serious, as the want of distention occasioned by their presence, is fully compensated by that of the surrounding structures. But where the greater part of the perineum is involved in the duration, preventing relaxation, and the necessary dilatation, causing an arrest of the process by the mechanical obstruction, interposed by this state of the organ, the resources of the practitioner seem to be exceedingly limited, the choice of means to be employed for the relief of the women lie between incisions, extraction and the Cæsarean operation. The former is most generally recommended, but where the compact mass involves the entire perineum and the inferior portions of the vagina and rectum, the latter affords the only forlorn hope, for either the patient or practitioner.

Sometimes fatty tumors are encountered in the pelvic cavity, but these, when not very large, from their compressibility, yield to the pressure made upon them, by the head in its descent, and become so far flattened out, as to present no insurmountable obstacle to the spontaneous delivery of the child. When large, the case must be managed the same as in other instances of obstructing masses in the pelvic cavity.

Tumors in the rectum, caused by large accumulations of hardened faeces, which fill up the excavation so far, as to obstruct the descent of the foetus, and consequently protract the labor, with the same results that attend delayed labors from any other cause of obstruction in the pelvic cavity. These accumulations sometimes become baked so hard, as to resist the action of enemata, when they constitute very effectual obstacles to the descent of the foetus. Under such circumstances, they have to be removed by a spoon or scoop. Lauverjat recommends introducing the finger into the vagina, and pressing or kneading the mass, in order to diminish its solidity, then acting upon it with injections, and in this manner remove the obstruction.

SECTION IX.—DEFORMITIES, IN RESPECT TO HEIGHT, ETC.

Gibbositas or curvature of the spine, not only constitutes an unsightly deformity, but also, frequently, very materially diminishes the stature of the individual thus afflicted; which unnatural and distorted state, when it involves the thorax, often renders respiration difficult by restricting the expansibility of the chest. When the lower dorsal and lumbar regions are the seat of the deformity, the action of the muscles of the loins and perhaps of the abdomen, is so much impaired as to render them almost useless in assisting the parturient efforts of the uterus. And when the function of respiration is impeded, the aid usually afforded by the action of the respiratory muscles is also withheld. When the dorsal and lumbar vertebræ are distorted so much as to restrict the action of the

respiratory, lumbar and abdominal muscles, the consummation of the labor devolves almost entirely upon the unassisted efforts of the uterus, unless artificial aid be timely rendered.

A few years ago we were consulted in regard to an unmarried woman with an external curvature of the lower dorsal and entire lumbar spine, whose height was about four feet and a half, and who was at her seventh month of gestation. The purpose of the consultation was to ascertain the state of the pelvis; whether it participated in the deformity of the spine or not. Upon examination it was found perfect in all its dimensions, the diameters ranging rather above the usual standard.

When summoned two months afterwards to attend her in labor we were prevented from going by a violent indisposition and referred the case to Dr. Linton, who informed us that the os uteri yielded kindly to the action of the uterus, and the labor progressed slowly but regularly for twelve hours, at the expiration of which time the head had descended into the cavity of the pelvis and completed its rotation; at this point, from the inability of rendering herself sufficient voluntary aid, and the exhausted state of the uterus from prostrated and excessive exertion, the expulsive efforts were insufficient to complete the labor. Dr. L. W. Buffington was now called in consultation, who proceeded to deliver her with the forceps, the child was well grown, but still born. The delivery which was effected almost entirely unaided by the organism, was attended by an extensive laceration of the perineum. The management of which case was reported for the *University Medical and Surgical Journal*, by Dr. Buffington, and is herein inserted.

Labors rendered dystocial from this cause must be terminated by turning or the forceps as may be indicated by the condition of the organs or state of the labor.

Treatment of Ruptured Perineum. We here transcribe the report of the treatment of lacerated perineum for the double purpose of instructing the student in the manner of managing such cases and of showing the importance of doing the operation well the first time. It very often fails to repair the injury from a failure in pairing off the edges of the wound sufficiently to give a broad raw surface on each side; and from not inserting the sutures sufficiently deep to hold the parts together long enough to allow them to become thoroughly agglutinated before the stitches slough out.

The following is by no means an isolated case, when the operation has had to be repeated, from a want of due attention in securing these two important elements of success.

The patient must be placed in the attitude most favorable for operating, one resembling that chosen for lithotomy is found to be the most convenient. The expedient of binding the soles of the

feet in the palms of the hands, as practised in lithotomy, before the introduction of anaesthetics into the practice of surgery, can be dispensed with. The patient must be placed on the back, on a mattress or table, with the thighs flexed upon the abdomen, and the legs upon the thighs, and the knees separated a convenient distance apart, and each supported by an assistant. This should be done under cover; the patient should not be exposed until after she is put under the anaesthetic influence.

The surgeon should have prepared, and placed within his reach, such instruments and appliances, as may be needed in the operation, as scalpel, scissors, needles, sutures, fine sponges, a supply of tepid water, the required dressings, etc. No one can be placed in a more awkward position, than to commence an operation, and have to suspend action every few minutes, and call for, or go in search of instruments or some other needful thing that has been neglected to be prepared beforehand.

Case. "J. M. W., a deformed girl, in very poor health, was delivered with the forceps, of a child dead in utero, for about a month before her accouchment. On account of a great spinal deformity she was obliged to lie on the side during delivery, which position favored a perineal rupture.

"She was very ill for nearly a month after, with utero-ovarian irritation; and severe pains of a neuralgic character supervened.

"Six weeks after confinement, her strength being somewhat improved, with the assistance of Dr. Linton and Students Bradfield and Stuart, I operated, she being first etherized by Mr. Bradfield, by chipping off the edges of the flesh and skin, and with a circular needle, I inserted three stitches with silver wire.

"The parts were dressed, and she was then carefully put to bed, and kept there for about ten days. The fifth day, her catamenia appeared freely. After thus exercising the greatest care for at least ten days, she was etherized again, and the sutures were removed. No union had taken place.

"The seventh of May, with the assistance of Mr. Stuart, she being first etherized, I operated again, cutting off with the curved scissors, on one side, and scalpel on the other, a much larger surface, inserting with the needle one stitch only of sadler's silk doubled, taking up much more of the tissue than at the former operation, and tying the ligature very tightly. Her sufferings for three or four days were of the most excruciating character, even a tablespoonful of tinct. opii. failed to give relief. A large warm bread-and-milk poultice finally relieved the intense throbbing pain in the parts. During this time she frequently ejected from the stomach large clots of blood. On the sixth day I removed the stitch, showing a very successful union of the parts."

CHAPTER IV.

SECOND VARIETY OF SECOND SPECIES OF DYSTOCIA.

INSTANCES DEPENDING UPON PRE-EXISTING CAUSES PERTAINING TO THE FœTUS.

SECTION I.—TRANSVERSE POSITIONS.

WHILE considering the subject of spontaneous evolution, we endeavored to show the possibility of a well-grown fœtus occupying a transverse position in the uterus, at term, notwithstanding Velpeau, Madame La Chapell and other eminent authorities, entertain contrary views. We then gave an opinion, which is sustained by many distinguished writers, that most, if not all the transverse positions, were primarily presentations of the side, either of one or the other; and that the dorsal and abdominal presentations, as described and insisted upon by the older writers, are but deviations of those of the side; that when the dorsum is said to present to the brim of the pelvis, it is only where the back inclines towards the os uteri, and where the abdomen is alleged to present, that surfacee is inclined towards the os. Magrier has nevertheless, in his illustrated Midwifery, published in 1813, given very precise and beautiful lithographic drawings of the first and second positions of the baek, the first and seeond positions of the belly, the same of the thorax, etc., but Velpeau says none of such drawings are taken from nature, and a mere glance suffices to satisfy us that they are all fancy pieces.

Obliquities of the uterus, or inclinations of the pelvic straits, great and unusual movements of the fœtus, particular positions of the woman, continued in for a length of time, etc., are alleged to be among the causes of these transverse presentations, existing previously to the commencement of labor. It is probable, however, that they are attributable to causes less meehanical in their character, and more certain in their action, to produce the result. Any circumstance that may interfere with the cephalic extremity of the embryo gravitating towards the cervical angle of the uterine cavity, in early pregnancy, as an accumulation of mucus, a mal-arrangement, the deidua, etc., and, subsequently, an irregular expansion of the uterus, from a want of harmony in the aetion of the fibres, would be certain to result in a malposition of the fœtus. As these attitudes are known to be attained occasionally, at the commencement of labor, from spontaneous evolution arising from

irregular contractions of the uterus, they are equally liable to be induced by irregular expansion of the organ during gestation.

As the phenomena, diagnosis, and treatment of transverse positions, resulting from spontaneous evolution during labor, have been given in detail in a preceding section, and as they are so nearly the same when resulting from pre-existing causes, to elaborate the latter, would be doing little more than to repeat what has been already said in reference to the former. The student is, therefore, referred to Section II., Chapter II., for all further needful information upon the subject.

The irregular side presentations, those designated by authors as the back, abdominal, breast, etc., which are rarely met with, and are but posterior or anterior inclinations of the foetus from the regular presentations of the side, are treated as such, by turning.

The following case, reported by my sister, A. M. L. Potts, M. D., in a letter dated at Stryker, Indiana, November 25, 1866, is one of side presentation, and particularly instructive in consequence of its rare complications. She says: "Two weeks ago, at midnight, I was called out, by one of the physicians of the place, to visit an obstetric case he had on hand; it being one of a difficult character, he chose me to counsel with. I arose and went with him; and, upon examination, concurred in the correctness of the doctor's diagnosis—a right side presentation; the right arm was protruding when he was called; he replaced it before coming for me, and it was still retained in the uterus when we arrived. Turning was at once decided upon, as the only means of saving either mother or child. He insisted that I should operate; the patient and friends, though not from want of confidence in the attending physician, united with him in urging me to undertake the case. In accordance with their entreaties, I did so; and, in about two hours from the time of the first examination, the child, a large female one, weighing nine pounds, was delivered by the feet; but still, no indications of life had been observed for several hours. This was the third still-born child of which she had been delivered.

"Some hemorrhage and a few contractile pains followed. Upon manipulating the abdomen, to excite sufficient contractions to expel the placenta, a large tumor was discovered in the upper part of the abdomen, presenting a very unusual appearance, and quite unyielding in its character. We allowed the patient to rest for two hours, as she was somewhat exhausted, ere we made the attempt at removing the placenta, except by alternate applications of heat and cold over the abdomen, and a moderate exhibition of infusion of blue cohosh, with a view of exciting greater uterine contraction. At the expiration of this time, I introduced my hand into the uterus, and, by following the course of the umbilical cord, found a decided hour-glass contraction, with the placenta in the upper

globe. After overcoming the stricture, or contraction, by gentle dilatation, etc., other trouble was discovered; an adherent placenta was encountered; but, by gentle and persevering efforts, the uterus was at length relieved of its contents, a very large after-birth, and a quantity of coagula. The patient endured the operation with a bravery characteristic of woman; she became faint several times, but was sustained by stimulants, and an unfaltering trust in her accoucheuse. She had an excellent recovery from her severe and perilous accouchement."

SECTION II.—MONSTROSITIES, AND PLURAL BIRTHS.

The classification of monsters, according to Buffon, is the most simple and natural one that we have been able to meet with; it embraces four classes, viz.: First, those that are characterized by a deficiency of parts. Second, those where there is an excess of parts or organs. Third, where the parts are neither deficient nor redundant, but deformed. Fourth, where they are neither deficient, redundant, nor deformed, but misplaced.

The first class constitutes a very large majority of instances of monstrosities, and may involve the absence of one or more parts or organs in the same individual as one or both eyes, parts of the mouth or lips as single or double hare-lips, with or without a cleft or deficient palate, or with defective palate and perfect lips. There are frequently serious defects or an entire absence of some of the urino-genital organs, both internal and external, in males and females, involving the osseous structures as the pubis, etc., and extending to the intestinal tube. Sometimes the anterior abdominal parieties are wanting, leaving the viscera exposed. Frequently the development of the heart and diaphragm is remarkably deficient. Occasionally a marked defect in, or entire absence of development of one or more of the extremities is observed, as an absence of both arms, or one fully, and the other imperfectly grown. We are not aware of their being an instance on record, of an entire absence of the lower extremities, while we have seen several cases where both the upper ones were wanting, a defective state of one or both the inferior ones in regard to length and size is not unusual.

Numerous cases of spontaneous amputation, during uterine existence, are reported; which constitute one variety of this class of monstrosities. The process of separation of the parts has been known to commence very early, as one case, at least, is recorded where the amputation of one foot was completed, at the third month of gestation (*Obstetric Memoirs and Contributions*, by Prof. Simpson, page 338). These mutilations are attributed by some writers, to a mal-arrangement of the membranes, by which the limb becomes surrounded and compressed at the point of separation, or to its being

encircled and compressed by the cord. But in two cases that came under the observation of Dr. Montgomery, it was shown that the phenomenon resulted from the constriction of the limb at the point of amputation, by a ligature of organized lymph. The extremities at different points have undergone spontaneous amputation, as the fingers, toes, hands, arms, feet, and legs, which parts have been expelled with the secundines, after the delivery of the mutilated foetus at different periods of gestation, and at term. Dr. Montgomery has collected ten cases of spontaneous amputation, and published them in the first and second volumes of the *Dublin Medical Journal*. These with three cases seen by Chausieur and one described by Watkinson, he refers to as the only accurately detailed cases that he could find on record, although he alludes to Haller, Murat, Richer, Désormeaux, and Billard, as having mentioned some supposed cases of the kind in their writings. (*Simpson.*)

An absence of the posterior portion of three or four contiguous vertebræ, constitute what is known as *spina bifida*, a variety of monstrosity, not of unfrequent occurrence. But in a physiological point of view, the most interesting and important variety of deficient organization, is that of the *acephalous* monster, which consists in an absence of all the lateral and superior portions of the cranium and brain. With the exceptions of the base of both of these, the being is headless. These cases are by no means rare, and they show that the cerebrum is not essential to animal life and development while in utero, for there are numerous instances where they have attained full intra-uterine size, and indeed where they have survived their birth for several days. Our friend Dr. Wm. Schmœle informs us that while in Germany some years ago he saw an acephalous monster who had attained his ninth year of age. We have a very fine preparation of an acephalous foetus, at term, in our University museum, which is perfectly developed, except the head, which slants off from just above the eyes, to the base of the os occipitis, leaving only the dura mater for the external covering of the diminutive cerebral mass.

Monsters from excess of Parts or Organs. It is by no means a rare occurrence for children to be born with a supernumerary of fingers or toes, or both in the same individual; which sometimes spring out from a finger or toe, or a part of the hand or foot contiguous to the roots of these. Sometimes they are merely fleshy masses suspended by a pedicle, having neither bone, nor nail points; at other times they possess bones, and well formed movable points, and are armed with tolerably well developed nails. These redundant growths seem to be marked characteristics of some families, susceptible of being transmitted from parent to child. Several children of the same family have been known to possess a surplus of fingers and toes, where one of the parents was similarly endowed.

These small parasitical excrescences are not sufficient to entitle their possessor to the distinction of monster, any more than the presence of congenital tumors or other adventitious growths, notwithstanding they sometimes appear to be amenable to the law of hereditary descent.

Those beings in which larger and more important parts or organs are supernumerary, the term is properly applied, as in cases of two heads, four arms, four legs, or two foetuses joined together; a small body or parts of one, growing out of some part of a larger and more perfect one, as in the case of A-Kee, the Chinese boy, sixty years old, who had the loins, nates, upper and lower extremities of a small parasitical brother escaping from the abdomen between the umbilicus and the sternum; and other similar instances are recorded by Ambrose, Paré, Palfyn, Winslow, and others. And where one imperfectly organized body is contained within another, in an unnatural way, as in a pouch extending from the perineum of a new born child, and where such a body is contained within the body of a male, as in the case of the lad Bissau, related by Richerand, and also that of a male child nine months old, who died of a tumor in the abdomen, which contained four pints and fourteen ounces, of greenish limpid fluid, and an imperfectly formed foetus adhering to it by a conical process arising from the umbilicus, reported by Mr. George Young, who frequently saw the child during its life. Mr. Highmore, a surgeon of Sherbourne in Dorsetshire, opened the body of a boy named Thomas Lane, between fifteen and sixteen years old, in June, 1814, in which he found the rudiments of a human foetus. The last two mentioned specimens are preserved in the Museum of the College of Surgeons.

M. de Saint Donat, a surgeon at Sisterton, gives an account of a foetus found in the scrotum of a man. And Velpeau presented to the Paris Academy in 1840, a preparation of the rudiments of a foetus, the whole mass being as large as a double fist, which he had removed from its connection with the right testicle of a man named Gallochat, aged 27 years. The tumor had existed from his birth and had increased up to the time he was three or four years old.*

When the parts are neither deficient nor redundant but deformed. All cases of congenital deformity of the limbs or other parts of the body come within this class, as strabismus, a union of two or more fingers or toes, constituting web-fingered or web-toed persons; the absence or distortion of one or more joints of a limb, as club-feet, etc., malformations of the genitals, as cleft scrotum, imperforate urethra or vagina; imperforate rectum, etc. In fact any malformation that neither adds to nor takes from the normal complement

* Ramsbotham's Principles and Practice of Obstetric Medicine and Surgery.

of the parts or organs of the body, constitutes this class of monstrosities; many of which can be removed or greatly improved by surgical interference.

Where the parts are neither deficient, redundant nor deformed, but misplaced. This class is of the most rare occurrence of either of the four, and consists most commonly of those anatomical anomalies occasionally met with in dissecting rooms, and noticed in works on anatomy, as mal-posed muscles, blood vessels, nerves, &c. But a more important and rare variety of this class, is found in those cases of transposition of the thoracic and abdominal viscera from one side to the other. A case of this kind is given by Dr. Bailie, which Ramsbotham says is the most perfect on record; it was that of a foetus with the heart on the right side, and other viscera transposed; it is preserved in the London Hospital Museum. This case of transposition of viscera is by no means an isolated one. We are informed by our colleague, Dr. A. R. Thomas, that during the past winter of 1867-68, there was brought to the anatomical rooms of the University an adult subject in which all the viscera of the thorax and abdomen were found to be reversed; the heart was on the right side, the right lung had two lobes, the left three, the curve of the aorta was from the left to the right and the distribution of the arterial trunks springing from the apex of the arch was reversed; the arteria innominata passing from right to left. The stomach was also reversed, the cardia being to the right and the pylorus to the left. The spleen was on the right side, and the liver on the left, with its fissures and lobes reversed. The head of the colon was on the left side and the sigmoid flexure on the right. A dried anatomical preparation was made from this subject which is preserved in the University Museum.

The misplacements constituting this class of monstrosities appear to be much less frequent with the external parts and organs, than the internal ones, as we have no cases on record of an eye and ear being transposed, or the mouth and nose; nor of an arm being attached to an innominate, or leg to a scapulum, nor anything to approximate it.

Causes. While treating upon twin pregnancies (page 269) we were led into a digression upon the subject of monstrosities, or such of them, at least, as consist of double foetuses, from the similitude existing between many of these duplex beings and twins, in reference to their origin and development. And from the fact of double-yolked eggs producing monster chicks, it was inferred analogically that the double monster foetus resulted from the human ovum containing a double yolk or vitellus. This proposition appears to us so manifestly true as scarcely to admit of a doubt. To this cause, or to an excess of the germinal principle in the ovum, may be attributed all those anomalies characterizing mon-

strosities, that are distinguished by a redundancy of the parts, from the perfect double foetus, through every descending grade of excess, down to the mere addition of finger or toe. The cause of the deficiency of parts that characterize the first class of monsters, according to Buffon, may be referred to: first, a defect of the germinal principle in the ovum, and, secondly, to spontaneous amputation, depending upon the parts that are deficient.

Where there is a deformity, with neither a redundancy nor deficiency of parts, the cause may be attributed to: first, a defective ovum, and secondly, to a malposition of the foetus in utero, with regard to the membranes or uterine structures, or thirdly, to a defective expansion of the walls of the uterus, during the early months of gestation, according to the character of the deformity.

To what cause to attribute the transposition of different parts or organs, it is more difficult to determine, unless it too be an ovular discrepancy.

While we do not, by any means, pretend to give a positive, unequivocal solution to the mystery that invests the origin of the various classes of monstrosities, we have ventured the foregoing hypotheses, more with a view of eliciting inquiry than of claiming to have established anything conclusive. The conviction with us is strong, that neither physiology nor mechanics alone is capable of producing all the phenomenal results we see manifested in the different classes of monsters, but that the aid of both must be invoked to consummate all that we witness in those erratic productions of conception.

What is contributed by physiology towards effecting the results exhibited by these beings, may be, with much confidence, attributed to defective ova. And the cases collected and reported by Dr. Montgomery, go far towards confirming his views in regard to the mechanical agency employed in effecting amputation of the limbs in utero. In not one of these cases is there any allusion made to the mal-arrangement of the membranes, or cord, as the cause of producing the solution of continuity in the part. In some instances the adventitious band was seen encircling the limbs, causing amputation and cicatrization by the slow process of gradual constriction. The healing process followed the work of destruction so closely, that by the time the separation was effected the healing was almost complete; in one instance, of evidently a recent separation, a small central point remained raw and unhealed but it skinned over in a few days after birth. The extremities of both sections of the divided parts generally presented the appearance of the most perfect stump of an amputated limb. In some instances the divided part was never found, but where an opportunity for observation was afforded, the amputated extremity was usually found perfectly healed and regular.

Management. Notwithstanding Cazeaux has been very precise in giving the diagnosis of monstrosities in utero; it will be found, in practice, to be a very difficult matter often to distinguish between a double headed or double bodied foetus and twins. As these are the only cases of monsters, where any unusual difficulty, attending their delivery, is to be apprehended, the means of making a correct diagnosis is a desideratum of great importance.

Where there is merely a deficiency, deformity or displacement of parts, the birth can be effected with as great facility as where there is no divergence at all, from the normal developments, hence it is unnecessary to dwell upon the manner of conducting the delivery, as such cases are referable to the rules governing eutocial labors.

A few plain propositions, laid down by Dugés and cited by Cazeaux, we transcribe, for the government of the young practitioners, in cases of double foetus, should any such ever be encountered by him.

"If two bags of water are detected by the finger, if it is necessary to rupture the membranes twice, if the waters are discharged at two separate and distinct periods, the presence of independent twins in womb may be regarded as certain; for there are never two envelops for a double monster, and two perfect twins are very seldom enclosed in the same amniotic-pouch. Again, if two feet, or even a single one descend with the head, more particularly if the feet yield to the traction made on them, and appear at the vulva without the head having a tendency to reascend, we may affirm that there are two infants, because a monster is never composed of two individuals, so united that the head of the one is along side of the feet of the other; but if several limbs present simultaneously, we can only ascertain whether the children to which they respectively belong are joined together or are independent, by carrying the hand up into the womb."

If the foregoing described marks be well defined, a correct diagnosis may be arrived at; but it is not always that we can decide with certainty as to the presence of a twin pregnancy, before one of the children is expelled, much less to ascertain that they are so united as to form a double monster.

Inasmuch as the chance of determining the precise character of the contents of the uterus is, at best, exceedingly slender, before the labor has progressed to the extent of dilating the os uteri, and bringing the presenting part within reach of the digital exploration, the most that can be done, is to patiently wait until this much be accomplished by the powers of the organism; and even then, if it be ascertained that the foetus is a duple product, it does not follow that art should be interposed, by any means; for it is evident, from the number of such labors, that have terminated

spontaneously, that a double-headed or bodied foetus may be born without assistance.

Whether it be determined that the foetus is a monster or not, as much time should be allowed for its unassisted delivery, as may be compatible with the woman's safety; if however it should be found that the powers of nature are inadequate to the work, such resources of art must be interposed, as are capable of affording the necessary relief.

The mechanism, exhibited during the delivery of a double-headed monster, differs according to whether the vertex or pelvis presents.

In vertex presentations, where the dorsal plane corresponds with the left side of the uterus, the head upon the right side will be anterior, and the one upon the left posterior, with regard to the brim of the pelvis. The axis of the body of the foetus being in direction of the axis of the superior strait, the right anterior head will be first to sink down into the excavation, while the left or posterior one remains lodged upon the sacro-vertebral angle, from which it escapes as the labor advances, and follows the anterior one in succession through the pelvic straits, and is the last to be expelled from the vulva. After the heads are born, the body passes with the usual facility.

When the body is expelled, in a pelvic presentation, its axis correspond with that of the inferior strait, which brings the left or posterior head first into the excavation, while the right or anterior one remains above the symphysis pubes, whence it is dislodged, by the action of the uterus, and enters the brim of the pelvis, and follows the preceding one through the straits, and is the last to escape the vulva, and complete the delivery.

When there is sufficient length of neck connected with each head, to allow of this mechanism, the delivery of a double-headed monster is much more easily effected than one would suppose from a casual observation of the being, after its birth.

Where the two heads are united together at one part of the cranium, and are not capable of following each other in succession, through the pelvis, for want of separate mobility, and greater flexible space between them, and their points of union with the trunk, but are compelled to enter the pelvis, or attempt it simultaneously, at full term, from their utter inability to pass; such resources of art must be interposed as promise most for the preservation of the life of the woman, as mutilation, a separation of the heads, or even the Cæsarean operation, as the dernier resort.

Where there are two bodies, each possessing a head, which are united, to a greater or less extent, by fleshy bands, as the Siamese twins, or by a more extensive base of union, as the sternum and abdomen, throughout their whole extent, spontaneous delivery is not impossible, as the numerous instances of such births can tes-

tify, though they are attended with much more difficulty than those of the preceding variety of monstrosities.

In speaking of the management of these anomalous cases, Ramsbotham very appropriately observes that "The varieties of monstrous formations, in excess, are so many and diversified, that it is utterly impossible to lay down rules to meet all exigencies. The conduct of the case, therefore, must be left entirely to the judgment of the practitioner; and the welfare of his patient will depend on the correctness of the views he has formed of natural and instrumental delivery, and on the dexterity he may have acquired by practice."

Plural Births. As a general rule, compound labors progress, through all the stages, more slowly than single ones. The pains are less frequent, shorter, and more inefficient, the os uteri is more tardy in dilating, and the propulsive and expulsive stages are more protracted. Sometimes, however, such labors are as rapid, and terminate as favorably, as where there is but one foetus to be expelled; especially in cases of twins, both children are born in less time than is occupied, in many cases, in giving birth to a single child. Such instances are when the most favorable conditions obtain, both in regard to the state of the uterus and position of the twins.

The delay, that usually attends accouchment in plural births, is attributed to excessive distention of the uterus, by which it is deprived of the power of contracting with as great force and frequency as when less expanded. This cause operates more especially in reference to the birth of the first child; while the expulsion of the second, or subsequent ones, may be retarded, in consequence of uterine exhaustion, induced by exertion during over distention, or from a malposition of the remaining foetus or foetuses.

The query naturally arises here, is interference necessary, in order to diminish the delay incident to labors in compound pregnancies? An answer to this question depends greatly upon circumstances. If, from the size and shape of the abdominal protuberance, a sense of excessive weight, and unusual clumsiness, and the generally enhanced complainings of the woman, we are led to believe that the case is one of compound pregnancy, and the labor is progressing regularly, but slowly, and unattended by any unfavorable symptoms, such as would render a speedy emptying of the uterus necessary, interference had better be avoided, and the process trusted to the powers of the organism. But, should exhaustion, inertia, or any other untoward circumstance supervene, jeopardizing the safety of the mother or either of the foetuses, and the state of the organs and advancement of the labor be propitious, delivery had better be effected either by manual or instrumental aid, as may be indicated. And should the birth of the second not succeed the delivery of the first in reasonable time, it, too, had better be assisted by artificial means.

When the health of the woman is good, and the powers of the uterus vigorous, and the first foetus presents by the vertex, its delivery may be spontaneously effected, without any unusual delay, and it be succeeded by that of the second one, within the space of a few minutes.

In case of delay, or otherwise, where the os uteri is dilated or dilatable, and the first foetus presents by either extremity, and the membranes remain entire, they should be ruptured, and the liquor amnii allowed to pass off, so that the contractions of the uterus may be brought to bear more directly upon the body of the foetus, and thus accelerate its expulsion. When the amniotic sack, containing the second foetus, also remains whole, and its contents present by either extremity, it, too, should be ruptured, for the reasons just given in regard to the first.

Should the signs of a compound pregnancy not be conclusive, before the birth of one child, after this event, such investigation should be immediately made, as to give entire satisfaction in reference thereto, before ligating and dividing the cord; this is done by placing a hand upon the abdomen; and if there remains an unborn foetus in utero, the abdominal protuberance will be found large and hard, compared with its condition when the uterus is empty. Should this not prove entirely satisfactory, after one or two pains, an internal examination of the uterus should be made, when the presence of the remaining foetus will be ascertained. This being determined, the cord of the first born should be ligated twice, about three-quarters of an inch apart, and divided between the two ligatures; this is to prevent the hemorrhage from the untied placental end, affecting the unborn foetus.

The presentations in compound pregnancies are not always of the most favorable kind. The first, however, most usually presents by one extremity or the other, either by the head, pelvis, or the feet, hence artificial interference is seldom required, except where danger threatens from delay, or some accidental complication; while the second is more liable to malpositions, arising, no doubt, from an excess of room in the uterus, caused by the expulsion of the first, favoring its spontaneous evolution.

The following table, which gives the presentations of both children in two hundred and ninety-one cases of twin pregnancies, as given by Cazeaux, will serve, as a matter of curiosity, to show the relative frequency of the positions.

IN 291 TWIN PREGNANCIES THE TWO CHILDREN PRESENTED AS FOLLOWS:

Both by the head, 134 times.	The first by the breech; the second by the elbow, 1 time.
The first by the head; the second by the breech, 55 times.	The first by the head; the second by the shoulder, 7 times.
Both by the breech, 12 times.	The first by the face; the second by the head, 1 time.
The first by the breech; the second by the head, 31 times.	The first by the feet; the second by one hand 1 time.
The first by the breech; the second by one foot, 11 times.	The first by the feet; the second by the breech, 1 time.
Both by the feet, 8 times.	
The first by the feet; the second by the head, 29 times.	

Notwithstanding the birth of the second child follows that of the first within a reasonable space of time, say from a few minutes to an hour or two; in most cases, and spontaneously, it sometimes occurs that it is delayed for several hours, days, weeks, months, and even years, as stated in a former part of the work (*Ibid.*, page 276). After rupturing the membranes of the second foetus, the commencement of its expulsion is announced by a renewal of the pains, which occurs generally from ten to thirty minutes after the delivery of the first; beginning mildly, but gradually increasing in force and frequency, until the birth is effected, which is seldom delayed on account of the resistance of the organs, as the relaxation, consequent upon the delivery of the first, continues until after the escape of the second.

When, from an exhausted condition of the uterus, occasioned by a protracted and fatiguing effort attending the birth of the first child, its contractions are unusually delayed, or from a malposition or any other untoward circumstance, its expulsion is prevented; the means that have already been recommended for deferred and protracted labors, must be employed; and transverse positions treated as heretofore indicated. The same observations are applicable to cases where two or more foetuses remain in utero, after the delivery of the first, and where the process of expulsion is delayed unusually long.

Where manual or instrumental aid is employed in the second delivery, care should be taken to avoid undue haste in effecting it, lest by emptying the uterus too suddenly, and removing the natural stimulus to contraction too speedily, inertia be induced, enhanced and prolonged, and the attendant hemorrhage increased. Where turning is deemed necessary, it is recommended to bring the pelvis to the superior strait, and then leave the labor to the action of the uterus, provided that be considered sufficient to effect its termination in due time.

It has occurred that the heads of both foetuses have engaged in the superior strait simultaneously; in this case the one that is the

more movable, should be cautiously pushed above the brim, so as to allow the other one to descend. Where the twins have been small, and the pelvis sufficiently ample, they have both been known to pass together. Where neither head can be elevated, an effort should be made to apply the forceps to the more advanced one, and deliver it by that means; but if this should fail, the crotchet must be employed as the dernier resort.

Instances are recorded, where the foetuses engage simultaneously by the pelvis, in the superior strait, and in this way come into the world together. Where this cannot be effected, the one less engaged should be pushed up so as to give room for the descent of the other. It is evident that neither two heads nor two pelvises can engage in the superior strait at once, unless they are comparatively small, or the strait unusually large, for ordinarily, one head or one pelvis is sufficient to occupy all the available space afforded by it, in the descent of the latter. The very fact of two of either, being found to occupy the strait simultaneously, should caution the practitioner against being too hasty in resorting to artificial delivery, while the uterus continues to act vigorously, and the strength of the woman to endure, for the resources of nature often prove themselves competent to overcome difficulties that may appear to be almost insurmountable, by either nature or art; and interference with her benign operations, only tends to complicate the original embarrassments, or create new ones.

The presentation of both pairs of feet may take place, where the pelvis is not remarkable for its amplitude, at the superior strait, nor the foetuses for the smallness of their size. No trifling amount of perplexity will be experienced in the management of cases where four feet are found to protrude through the os uteri into the pelvic cavity simultaneously; the greatest difficulty will arise from our inability to determine to which individual foetus each pair of feet belongs. With this uncertainty, it would not be safe to make traction, because it would be as likely to be made upon one foot of each foetus, as otherwise, in which case the complication would be increased, instead of remedied.

Even where two feet only present, the uncertainty of determining, whether they both belong to one individual, or one to each, would be very great, and traction upon more than one foot would be attended with great risk of increasing the trouble. If they both belonged to one foetus, drawing upon one would cause the body to descend; while if they belonged one to each, traction upon both would cause their bodies to be wedged together in the pelvis, and the greater the effort made for their extraction, the tighter would they become compressed, and the more and more difficult would their delivery be effected; if, indeed, it could be effected at all.

Perhaps all these double presentations could be better managed

by adopting the plan recommended by Hippocrates and which was employed by Pleissman, in his case of the presentation of four inferior extremities, which were delivered as far as the hams, with one arm. He was in great perplexity because he could find no way of introducing his hand into the uterus for the purpose of distinguishing and seizing the two feet belonging to each child, and because all his efforts to make even one of these extremities go back again proved abortive; besides which in drawing on any two of them, he might confound and bring down the feet of two different foetuses at the same time; and lastly, he observes, "even if I succeeded in seizing the two feet belonging to the same child, I might by drawing on them engage the other parts, and thus augment the difficulties. Being greatly embarrassed as to the proper course and yet obliged to act, the employment of a measure recommended by Hippocrates under different circumstances, happily suggested itself. It was to suspend the patient by her feet, hoping that the heads and the bodies of the children would, by their weight, draw one or more of the extremities towards the fundus of the womb, which was still distended by the waters. The husband and brother-in-law of the woman passed their arms under her hams, and thus held her suspended, so that only the head and shoulders rested on the bolster. I intended as soon as I mounted the bed, to press back one or more of the free extremities into the womb, but two had already returned from the mere position of the mother, and the other three soon followed by the aid of my fingers. Immediately afterwards, I was enabled to introduce my hand into the uterus, and to withdraw successively therefrom the children by the feet."

In view of the success attending the postural treatment of prolapsus of the cord and shoulder presentations, the plan advised for overcoming the graver difficulties arising from double presentation in compound pregnancies strikes us very favorably, and even in cases where the waters may have escaped, we should not reject it where the other means that have been recommended fail in removing the cause of our embarrassment.

SECTION III.—DISEASES AS HYDROCEPHALUS, HYDROTHORAX, ETC.

Hydrocephalus, *υδωρ, udon*, water, and *κεφαλη, kephale*, head, *water in the head*. *Dropsy of the head*. A collection of water in the head. Called also dropsy of the brain.

Authors have divided it into two varieties, viz.: Internal and external.

Hydrocephalus Internus. This variety is seated in the interior of the brain and is observed particularly in childhood; but it is with its existence during foetal life, and as a cause of dystocia, that we have to do here. Viewed in this light, it is made to include all the

infusions and infiltrations of serum and other fluids within the cranium, tending to increase its size and hence to interfere with its passage through the pelvic canal. It rarely exists to the extent of rendering the interposition of art necessary in effecting delivery. According to the experience of Madame La Chapell, it only occurred fifteen times in forty-three thousand five hundred and fifty-five labors.*

The disease is one of a very grave character, whether it exists in a mild or aggravated form, where the accumulation is so trifling as not to interfere materially with the process of labor it almost invariably, if not quite so, proves destructive to the life of the child after its birth. And where it is greater, so as to require assistance, the means of destruction are frequently brought into requisition, although the distention from the contained fluid may be such as to only require the forceps or turning to overcome the impediment.

Diagnosis. Presuming the os uteri fully dilated or dilatable, and no obstacle, to a thorough examination, present on its account; if the exploration be commenced during a pain, the finger will encounter a broad, dense body with but slight convexity, covering the entire area of the inlet, and extending beyond its borders in every direction. As the pain subsides the density of the presenting body will be found to diminish, and finally to give place to comparative softness and fluctuation. Now the loose bones of the cranium may be distinguished, the mobility of which will depend upon the quantity of fluid present, and the extent of separation between them. The sutures, from the far separation of the bones, are very broad, and the fontanels excessively large. In these particulars, the head differs so widely from one in its normal state, that the peculiar condition of it can be easily determined. The next contraction will again renew the density of the head, which will continue to alternate between firmness and relaxation, as the labor progresses.

Where the disease is less excessive, these diagnostic marks are correspondingly less developed, and the head, instead of lodging upon the pelvic circle at the inlet, engages within it to a greater or less extent, but is not able to pass spontaneously on account of its undue size.

Where it is still less, the sutures and fontanels will be found unusually large, but not so much so as to allow of any perceptible mobility of the bones. The head will enter the brim more effectually, and may pass the organs unassisted.

Hydrocephalus Externus consists of serous, sero-sanguinolent, or other infiltrations beneath the scalp, or between the pericranium and skull. Though this affection, which is commonly found in con-

* Cazeaux's Midwifery.

nection with œdema of the woman, is capable of augmenting the size of the head to a considerable extent, it seldom if ever increases it to the degree of rendering its expulsion impossible, in a healthy and well-formed pelvis. According to Cazeaux, it is usually associated with a state of general œdema that destroys the foetus at an earlier period of pregnancy, and consequently its expulsion is effected without difficulty, whatever may be the thickness of the scalp. He observes: "I saw a seven months' child, at La Clinique, in 1838, in whom this part was a finger's breadth in thickness, and the mother, also, was quite œdematosus; the labor terminated without difficulty." Dèsormeaux speaks of two very similar cases.

Treatment. For the worst form of internal hydrocephalus, when the head is so enormously distended as to render it impossible to engage in the superior strait, cephalotomy has been recommended; and a question has been raised in reference to the morality of the expedient, some maintaining that the life of the child should not be sacrificed, while there remain other resources, by which it may be extracted alive, although they may jeopardize the safety and even the life of the mother. The Cæsarean operation, or symphysotomy, is recommended by these pseudo humanitarians instead of cephalotomy, thus putting in imminent danger the life or comfort of the woman, to prolong the existence of the invalid infant for a few hours, or days at most, for it is well known that such children seldom survive their birth a longer time than here specified; and even if they do, they are consigned to the deplorable state of idiocy, to which death itself is far preferable. Both humanity and morality are strongly inclined towards the latter operation, when placed in juxtaposition with either of the former, as means of overcoming so serious an obstacle to the parturition of the unfortunate foetus.

But cephalotomy is seldom needed; a simple puncture of the head with a trocar, or a guarded bistoury, so as to permit the fluid to escape, will be found sufficient to allow the head to collapse; when by the action of the uterus it will engage in the superior strait, and be forced through the pelvic canal. Perhaps its passage may be facilitated by the aid of the blunt hook, if undue delay is experienced. Should the foetus present by the breech, and the body be expelled, the puncture must be made through the bones towards the base of the skull, as the sutures here are not so broad nor well marked as in the superior portions of the head, and consequently cannot be so readily distinguished.

In this case the trocar, or a strong knife, wrapped with tape, so as to conceal the edge, to within half an inch of the point, must be employed as the puncturing instrument.

In the less formidable cases where the head partially engages in

the superior strait, but is too large to pass spontaneously; and where from long continued and vigorous efforts the uterus is in danger of falling into inertia, recourse must be had to the forceps. Velpeau recommends "taking care to make use of a moderate pressure so as not to burst the head, nor allow of the instrument's slipping." In managing a dystocial labor, rendered so from hydrocephalus, we should not make it a point to favor the child in the least, where such a course would in the smallest degree enhance the danger of the woman, or increase or prolong her sufferings for the reasons already given. At the same time we would reprobate any wanton neglect or acts of cruelty unnecessarily inflicted upon it, or where such a course would not positively and materially augment the mother's safety, and promote her welfare.

Turning has also been recommended as a means of surmounting the difficulties attendant upon this cause of dystocia, which may, under some circumstances, be preferable to the forceps. If neither can be rendered successful, recourse must be had to puncturing, as in the preceding instance.

When the head is but slightly augmented in size, it seldom requires other than the powers of the organism, to effect its expulsion. When this is delayed so long as to endanger the integrity of the uterus and threaten inertia, turning or the forceps may be employed to aid the delivery.

Hydrocephalus Externus rarely exists to the extent of furnishing any real obstacle to delivery; when, however, the presence of thrombuses and infiltrations are detected, and they are of such magnitude as to interfere with the rotatory movement at the inferior strait, such manual assistance should be rendered as may be necessary to overcome the obstacle to rotation. And in case of dangerous delay, turning or the forceps must be resorted to, as in the last mentioned paragraph.

Hydrothorax. As rarely as hydrocephalus is met with as a cause of dystocia, hydrothorax is of still less frequent occurrence. Its presence is indicated by an excessive enlargement of the thorax, by which the descent of the body through the pelvis is arrested after the head has passed the upper strait, and occupies the cavity or vagina, or has even escaped from the vulva. The intercostal spaces are increased in conformity with the general enlargement of the chest and the separation of the costal arches from each other; through these widened spaces it is alleged that evident fluctuation may be observed. While the head and neck occupy the space below, the brim and the body above, the student may wonder how these pathological conditions can be satisfactorily ascertained. We confess we are not able to relieve him of his embarrassment, as the position of the head and neck effectually prevents the hand from passing above the superior strait. We have no means of detecting

fluctuation, either by pressure upon the intercostal spaces or percussion. In a chest filled and distended with fluid, there evidently must be undue separation of the ribs and necessarily a corresponding widening of the intercostal spaces, and through these, fluctuations may undoubtedly be manifested. But while the thorax remains in the uterus, inaccessible by the hand, the fact of the existence of these conditions must be received by induction, as they cannot be ascertained by observation.

When there is a less degree of distention which does not amount to a perfect arrest of the chest in its passage through the superior strait, it cannot be facilitated by manual assistance, and without the employment of any destructive agencies. And where the thorax is still less distended, but is beyond the usual normal size, it may be compressed so as to pass the strait by the spontaneous action of the organism, and parturition be effected without artificial interference.

Treatment. Where the magnitude of the thorax is so great as not to admit of its engaging fully in the superior strait, puncturation is the only remedy that can be resorted to with any certainty of success. After the head has escaped from the vulva, it should be pressed back upon the perineum, so as to allow of the introduction of one or two fingers, which should be passed up along the neck, where, above and behind the clavicle, a tolerably tense, elastic fullness will be felt. This is caused by the fluid contained within the thorax, pressing the structures upwards, and out of their normal position. Such a result must, necessarily, arise from the presence of a quantity of fluid sufficient to cause such an enormous distention of the chest, as to prevent its entrance into the inlet, because all the soft tissues concerned in retaining the fluid, will first yield to the constantly accumulating pressure, to the extent of their capacity, before any displacement of the osseous structures can occur.

Into this elevated surface must the puncturing instrument, a long trocar, or wrapped scalpel, be plunged, to a depth sufficient to reach the cavity. If the trocar, which is the preferable instrument, be employed, the stilet must be withdrawn, and the canula allowed to remain in the wound, through which the fluid will pass, until the cavity becomes empty, when the thorax will collapse so far as to enable it to be squeezed into the superior strait, by the action of the uterus, which, with what traction that may be necessary, will readily complete the expulsion of the foetus. If the scalpel be used, the opening must be made sufficiently large to allow the liquid to escape freely. Such punctures, when small, are apt to close up and arrest the discharge before the contents of the affected cavity are half removed.

When the chest is less distended, and is permitted to engage

partially in the superior strait, and the action of the uterus continues vigorous, it may be so far aided by traction, as to be able to complete the delivery, without resorting to puncturation. And in a still less degree of enlargement, when the thorax is permitted to fully enter the inlet, the unassisted powers of the organism may be sufficient to terminate the labor, though probably not without considerable delay.

Ascites, from *ασκος*, *askos*, "a bottle." A collection of serous fluid in the abdomen. Dropsy of the lower belly. Ascites, proper, is dropsy of the peritoneum.

This affection is sometimes met with during intra-uterine existence, and, to an extent, rendering spontaneous parturition impossible. It occurs perhaps less frequently than hydrocephalus, but oftener than hydrothorax.

Like the two latter forms of the disease, it may exist in an excessive, moderate or trifling degree.

In the first instance, the abdomen is so enormously distended, that it is prevented, entirely, from engaging in the superior strait; in which case, a large, soft, fluctuating tumor will be found above the brim, while the head, neck, and perhaps the upper portion of the chest, will be found without the organism, with the other part occupying the cavity and inferior strait. At this point, with the child half born, the progress of the labor is arrested, and no action of the uterus, nor reasonable traction, is able to relieve it. In this situation of affairs, the delivered parts of the child are to be pressed back against the perineum, and one or two fingers passed up in front of the undelivered portion of the chest, until the hypogastric region of the enlarged abdomen be reached, at the superior strait, which will reveal the nature of the difficulty and suggest the remedy.

Instances are recorded where immense accumulations of urine in the bladder have been mistaken for ascites, and which have arrested the progress of labor in the same manner.

In the second degree of distention, the abdomen engages partially in the superior strait, but not with sufficient facility to enable the delivery to be effected without assistance. Sometimes the ascites relieves itself in a very singular but efficient manner. The contractions of the uterus force the upper part of the abdomen into the inlet, by which process the fluid is pressed, or, as it were, stripped from the hypogastrium, into the lower abdomen above the brim, the abdominal walls yielding to the pressure sufficiently to accommodate the water, until it begins to gravitate, into the part now occupying the cavity. As it continues to trickle from the chamber of the abdomen, above the strait to the one below it, it diminishes in quantity in the former and accumulates in the latter; and during this transition, the water being distributed and the

uterus continuing to act energetically, forces the abdomen into the strait as rapidly as its diminished size will admit; at the same time the upper, or hypogastric region, is being propelled through the inferior strait, and in this manner is the labor spontaneously terminated.

When the abdominal enlargement is inconsiderable, though in excess of its normal condition, the affected part will be found to engage in, and pass through, the pelvic canal without the interpolation of art. The length of time and amount of suffering that will be required to effect this, will be in proportion to the size of the abdomen and the force and efficiency of the contractions.

Treatment. Where the increased size of the abdomen prevents its entering the superior strait, and the labor is arrested in its progress, and the real cause of the delay is ascertained, as in the case of hydrocephalus and hydrothorax, the only alternative is to puncture the tumor and evacuate its contents. This will enable it to collapse, so as it can engage in and pass the straits, by the action of the uterus. A certain amount of traction may be needed to insure a timely expulsion of the foetus.

This operation is performed by passing a long trocar up between the index and middle fingers, in front of the undelivered portion of the thorax, until the projecting abdominal tumor is reached. It must then be plunged into the fluctuating prominence, to the depth of one or two inches, and the stilet removed. The canula must remain in the wound until the fluid ceases to flow. Should it cease before a large quantity has escaped, a wire of proper size must be thrust through the instrument, to remove such obstructions as may close it up, as the adjacent tissues are sometimes carried, by the current of the escaping fluid, into the end of the tube, obstructing the flow. Where interference is caused by a distended bladder, it must be evacuated by puncturation also. Frank mentions a case of ascites, in which the breech presented, where the fluid passed from the abdomen into the scrotum, and was evacuated by puncturing that part. Where hydrocele and ascites occur simultaneously, an attempt to remove the fluid from both cavities, by puncturing the scrotum, should be made.

Where the tumefaction of the abdomen will admit of a partial engagement into the superior strait, it is evident that the quantity of fluid is not so great as to entirely fill the cavity, and that it is pressed out of the portion entering the strait, into the disengaged part, and that the parietes yield to afford space for it, in its more compressed limits. By slow and moderate traction, and the increased pressure, thereby produced upon the contained fluid, it may be forced through the constriction encountered at, and produced by, the pelvic brim, and made measureably to reoccupy the hypogastric region; and by such a diffusion or transposition, so far diminish the tumor above the brim as to admit of its entrance

and so, by continuing the traction, with intervals of desistance, during the absence of pain, aided by the uterine contractions, delivery may be effected without resorting to puncturation. If, however, after persisting in this manœuvre a proper length of time, and the energies of the uterus show any signs of failing, recourse must be had to the latter expedient.

In cases where the tumefaction is not so great as to prevent the abdomen entering the superior strait and passing through the pelvic canal, the labor may be terminated spontaneously; but the process may be prolonged to an undue length of time, in consequence of the increased size of the part, compared with the normal state. Under such circumstances, proper and well-directed traction may be made to co-operate, advantageously, with the contractions of the uterus.

Emphysema, from *εμφυσω*, *emphysao*, "I inflate." This is where a part or parts are inflated with gas, causing a corresponding enlargement. It may be partial, and confined to one or more of the cavities, or generally involving all the cavities and cellular tissue.

It is our present purpose to consider it only as a cause of dystocia, and in relation to the dead foetus in utero.

It occasionally occurs, upon the death of the foetus, taking place towards the close of gestation, after it has acquired its full size, or nearly so, and during the process of incipient decomposition to which it may become subject, that the thorax or abdomen or both, including the cellular textures become so inflated as to increase its dimensions so far as to render its spontaneous expulsion from the organism, difficult, if not impossible, without incurring the risk of lacerating some of the structures involved in the process, or otherwise endangering the safety of the woman.

Merrimen observes: "I have known two instances of rupture of the vagina, arising from the rashness of midwives, who forcibly dragged the children, enormously swelled with putrid air, into the world. In one case the vagina was torn completely through. Both women died in a few hours. Had the bellies of the children been punctured, to give vent to the air, these fatal occurrences would have been avoided."

"M. Depau has recently published a case, in which not only was a large quantity of gas developed in the abdominal and thoracic cavities, but the limbs of the child were so greatly infiltrated as to present nearly double their natural size."* The head was extracted by the forceps. And then to insure a greater amount of compression and traction than the common forceps is capable of affording, the trunk was seized with the cephalotribe forceps. Under the action of this powerful instrument, a large amount of exceedingly

*Cazeaux Midwifery.

foetid gas escaped with a report, and very strong tractions were required to disengage the chest. The uterus in contracting expelled a similar kind of gas.

Could the diagnosis be well established in such cases, puncturing the abdomen and chest would greatly facilitate the use of the cephelotribe, or even render its employment unnecessary.

CHAPTER V

RETAINED PLACENTA.

SOME authors arrange the management of the placenta under two heads, viz.: Unassisted and assisted delivery. According to instructions we have already given, the unassisted delivery of the placenta can be of but very seldom occurrence, because the time for allowing it to pass off spontaneously is very limited, being only that employed in resuscitating the child, when required, and ligating and dividing the cord. When it is expelled during the performance of these duties, it is unequivocally an instance of unassisted delivery. Where it remains unexpelled, after the cord is divided, and the child consigned to the care of a nurse, for reasons deemed sufficient, already given, its delivery, by manual assistance, should be attempted, when it will very often be found lying loose in the vagina or cavity of the uterus, having been partially or entirely separated by the last expulsive efforts of that organ. In addition to the reasons hitherto assigned for the immediate delivery of the placenta, after the birth of the child, another very important one is here presented, which is, that of rendering unnecessary the continuance of one of the causes of retained placenta, viz.:—atony or inertia of the uterus, as given by authors; for, if the accoucheur proceeds at once, after the delivery and separation of the child, to remove the placenta, the means resorted to to effect this will lead, unmistakably, to a detection of such a condition, which will receive immediate attention, and by frictions externally, and the movements of the hand internally, action will be promptly restored to the organ, the inertia overcome, and the hand and placenta expelled together; thus obviating the hemorrhage that would, almost necessarily, intervene during the time uselessly wasted in waiting for the placenta to be expelled spontaneously.

The fact of the recognition of atony or inertia as a cause of retained placenta is only an evidence of a want of promptness in removing it at the most auspicious moment which is immediately after the birth and separation of the child. While this condition of the uterus may be one of the causes of retained placenta in the estimation of the uninformed or irresolute practitioner, he who derives confidence from his knowledge of the phenomena of parturition cannot so regard it, because with him it is a conviction that it should not be retained under such circumstances a longer time than is necessary to remove it by well directed manual interference. Deviating, then, from the authorities so far as to discard this as an unavoidable cause of retention, we will confine our observations to two conditions which render a retention inevitable. First, *irregular spasmodic contractions, known as the hour-glass contraction, or encysted placenta.* Second, *morbid adhesions.*

SECTION I.—HOUR-GLASS CONTRACTION,

Constitutes one of the varieties of irregular spasmodic contraction of the uterus occurring immediately after the birth of the child, and owing to an irregular distribution of the motor force of the organ, excited perhaps by the parturient function. Some authors with a great deal of precision divide these irregular contractions into three different varieties, according to the point of the organ contracted and the character of the contraction, in relation to its action upon the retained placenta. Thus when the constriction occurs at the internal os, it is called *hour-glass contraction*, when at or near the middle of the body they term it an *encystment of the placenta*, and when the uterine walls in contracting upon the circumference of the placenta, constituting around its margin, a kind of collar which encases it, it is denominated *encasement of the placenta*. These are very nice distinctions theoretically, but they afford no practical difference either in regard to cause, symptoms or treatment. They are rather a display of scientific refinement than points of practical utility. We shall, therefore, be content with studying hour-glass contraction as a cause of the retained placenta, and regard the other two conditions rather in the light of phenomenal phases of the prime cause, than as distinct varieties.

Hour-glass contraction consists of the contraction of the uterus at a certain point, whereby its bulk at that point is greatly diminished, leaving the remaining portions uncontracted and flabby, amounting almost to atony; or partially or strongly contracted, sufficient to give them a greater or less degree of firmness. The extreme contraction most frequently takes place at the internal os, which is in this condition of the viscus, some four or five inches above the external orifice; the neck being prolonged to that extent by

and during the late gravid state of the organ. Occasionally it occurs at or near the middle of the body. (Fig. 96.) Let it take place at either of these points, or at any other one in the organ, the stricture divides the cavity into two chambers or globes, one being above, the other below the point of contraction, at which it is so greatly diminished, as often not to admit the point of a finger after allowing of the transmission of the cord from the placenta confined in the upper chamber. At the point of the stricture, the external surface presents an indentation, corresponding to the internal contraction, thus giving the organ somewhat the appearance of the figure 8, being large at both extremities, and very small between them, resembling in shape the hour glass from which it derives its name.

Cause. The precise cause of the irregular spasmodic contractions, resulting in hour-glass contraction, it is very difficult to determine. We have already affirmed that it is owing to an irregular distribution of the motor force of the organ; but what determines that irregular distribution, is a question not so easily solved. Illy-timed efforts in attempting the removal of the placenta, as undue or too violent friction, an injudicious handling of the organ, pulling, or jerking at the funis, the abuse of stimulating drugs or drinks, etc., may so far interfere with its regular functions after delivery, as to cause the phenomena under consideration. It is said to occur more frequently after twin deliveries than single ones.

Stoltz maintains that these irregular spasmodic contractions of the uterus, depend upon the predisposition existing in the organ itself; while Dr. Duglass, of Dublin, declares that this hour-glass contraction is not produced by any principle of action inherent in the uterus itself, and whenever it does occur, it is caused by mismanagement.

We cannot entirely agree in opinion with Dr. Duglass, because we have met with cases that appeared to be continuous with the last expulsive contraction, the accident manifesting itself immediately after the escape of the child from the uterine cavity, before any manipulation whatever had been practised, with reference to

FIG. 95.



FIG. 96.



Two examples of Hour-glass contractions. One at the fundus, and the other near the centre. In both of which the placenta is retained.

either inducing contraction or delivering the placenta, showing, conclusively, their spontaneous production.

Velpeau mentions the case of a woman, to whom he was called by Madame Bevalet, where there were two strictures; after passing the first, he found a part of the placenta in a large cavity on the left side of the uterus. The second stricture enclosed a portion of the mass, and in another cavity, at the right side of the fundus, the remainder of the placenta was found. He says: "An encysted state of the placenta is always the result of irregular contractions of the womb, after the escape of the foetus." But he does not attempt to explain its cause.

It more frequently follows quick and violent deliveries; those in which the head and body of the child are projected by a single contraction, than more tardy and moderate ones, especially those in which no time intervenes between the birth of the child and the manifestation of the accident. There is no doubt that in those violent and rapid deliveries, where the child is propelled through the straits, and expelled from the uterus, by one irresistible and continuous contraction, that the uterine fibres are under the direct influence of spasmody action, to which the rapid escape of the foetus is due, and that the spasm continues after the expulsion of the child, occasionally, to affect the whole organ, as seen sometimes in the immediate contraction of all its parts, even the os, so that it requires to be redilated to allow of the removal of the placenta. Sometimes, the general spasmody action seems to be translated to and concentrated in some part which becomes unduly contracted, while the residue remains proportionably relaxed, as is seen where one side is strongly contracted, while the other is unusually flaccid; so, also, in hour-glass contraction, a portion of the circular fibres become often violently affected by spasmody action, while other portions of the organ remain perfectly atonic.

When it results from mismanagement, the spasm arises from the violence or injudiciousness of the interference, and not from the inherent predisposition of the organ.

There can scarcely be entertained a doubt, that hour-glass contraction sometimes results from the inherent predisposition of the organ, as suggested by Stoltz, and as seen after those rapid deliveries, and sometimes from injudicious interference, as declared by Dr. Duglass, and as seen attending attempts at delivering the placenta. The difference of opinion entertained by these two distinguished authors, can only arise from the difference in the cases constituting their experience.

Symptoms. If two or three sharp pains, nearly or quite as severe as those causing the expulsion of the child, succeed each other rapidly, immediately after its birth, and not attended by the descent of the placenta, there may be strong grounds of suspicion

that its retention is the result of irregular spasmody contraetion ; and if blood be ejected from the untied end of the cord, in an undue quantity, and with unusual force, it is evident that the placenta is being compressed in a small space, and the blood squeezed out of it by the pressure to which it is being subjected.

In confirmation of this suspicion, the uterus will present the irregular shape, incident to hour-glass contraction, which may generally be detected by abdominal palpitation. The resistance manifested by the placenta, in responding to traction upon the cord, is also confirmatory of the character of the cause producing the retention. But a tactile examination of the interior of the uterus, will dissipate all doubts, if any remain, as to the nature of the retention.

The introduction of the hand may be impeded by an unusual rigidity and contraction of the os, or it may be found flaccid and easy of entrance. By following the course of the cord, instead of its leading to the placental mass uninterruptedly, it will be found emerging through an aperture of greater or less dimensions, sometimes so small as to compress it considerably, at other times, from one to two or more inches in diameter, the borders of which are generally firm and resisting. The cord thus emerging, shows that the placenta is confined above the stricture, in the upper globe of the irregularly contracted uterus, where it may often be felt. Instead of the cord always occupying the strait, it will sometimes be found to contain a portion of the placenta, upon which it contracts with a power sufficient not only to retain it, but to prevent its being removed by the exercise of an extraordinary degree of traction upon the cord. Indeed, this will often rupture, and the structures of the mass yield to laceration, before it can be dislodged from the embrace of the stricture. There is seldom much hemorrhage when the placenta is retained from this cause. Hour-glass contraction is usually attended with but little pain, after the two or three immediately succeeding the birth of the child.

Sometimes the part of the uterus in which the placenta is confined, contracts so firmly as to mould itself upon it, to the extent that the nodes or cotyledons of the placenta are impressed in its substance. Post-mortem examinations have revealed such instances ; one of which is related by Velpeau ; that occurred in a woman who died at the *Hospice de l'Ecole*. Such may be regarded as extreme cases of encystment of the placenta, because the chamber, which is uniformly the upper one, formed mainly by the fundus, (Fig. 95,) is so perfect in its form, that it resembles a cyst or cell, and it contracts so firmly about the placenta, that the latter may be compared with the contents of an encysted tumor, hence the term, encysted placenta, that authors have applied to it. When the uterine walls contract around the circumference of the placenta, and

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encase it, like a watch-glass in the lid, as compared by Leroux, it is termed encasement of the placenta. One instance of the kind is reported by the author just named. But Velpeau says no such case has been noticed since, and regards it as a mistake, similar to the one committed by M. Herbin, when he thought the after-birth was encysted in the Fallopian tubes.

These different conditions attending the retained placenta, from hour-glass contraction, are merely accidental, belonging to the same category of contingencies that make the numerous trivial variations, in regard to the exact position of the placenta, in the constricted uterus, and the precise degree of contraction retaining it, that are constantly being met with; and constitute the peculiarities of different cases, without interfering in any way, with their general character, or the course to be pursued in reference to their treatment, and of course of no practical importance.

Treatment. There appears to be a want of uniformity in regard to the management of hour-glass contraction of the uterus. Some authors, among whom we find Cazeaux, recommend waiting four or five hours, for the spasm to pass off spontaneously, especially where there are no complications, rendering immediate action necessary, as excessive nervous agitations, convulsions, etc. Where the cause of retention continues beyond this time, opiates are advised, in doses sufficient to overcome the spasmodic action; and should these fail to accomplish the end desired, venesection is recommended; and should this also fail, dilatation of the stricture, by manual interference, is directed as a final resort. Velpeau is opposed to hasty action of any kind, and thinks it best to wait, but how long he has not informed us. In case of complications, threatening the safety of the woman, he advises immediate action, by introducing the fingers into the orifice of the stricture and dilating it.

We confess our embarrassment in discovering the advantage of this course of treatment. What utility there can be in four or five hours' delay, we are unable to perceive. And we cannot refrain from questioning the propriety of resorting to opium and venesection, as means of relaxing the spasm, that holds the constricted part of the uterus in a state of persistent contraction, especially where the remaining portions are so persistently inert. If we had complete control over the action of these agencies, and could direct their anti-spasmodic influence to the precise spot constricted, and relax the very fibres that are morbidly contracted, and there confine its effects, much benefit might be derived from their employment. But as it cannot be expected to relieve local spasm by general means, in any other way than by inducing general relaxation, before the uterine stricture could be overcome, the inertia affecting the uncontracted portions of the organ, would necessarily

become so increased that, after the removal of the spasm, it might prove difficult to excite in it normal contraction, and the trouble thus induced might be more serious than the one we desire to remove.

In managing a case of hour-glass, we should enjoin neither undue haste nor unnecessary delay. As soon as the nature of the difficulty, or cause of the retention becomes known, we should proceed at once to introduce the hand, and following the cord to the aperture through which it passes, we would commence dilating the stricture, if small, by first inserting one finger, and by an annular movement so enlarge the ring as to admit another, and by the same movement increase it still further, so as to admit the third and fourth; then, by placing all in a conical form, commence a gentle rotary or boring motion, gradually pressing the hand upwards, until the knuckles pass the stricture, and the hand enters and occupies the upper chamber. If the stricture has by this time become dissipated entirely, the placenta may be grasped and removed. But if the contraction remains and the orifice continues too small to allow of the escape of the hand and placenta together, the latter must be hooked down a little by little, until a portion of it is brought within the circumference of the opening, when the hand must be withdrawn from the upper chamber, and allowed to rest in the one below the aperture; then, by working down the mass as before, and at the same time making as much traction upon the cord as it can bear, the placenta is to be brought through the stricture, into the lower chamber, and finally removed from the uterus. Should the cord be ruptured during this manœuvre, no other damage would result than the loss of it as a guide to the placenta, and as a means of traction on the mass.

If the effort to introduce the hand into the upper chamber should succeed completely in removing the stricture, no haste need be made in withdrawing it with the disengaged placenta; for, by allowing it to remain a short time, its presence may excite general contraction from the fundus downwards, which will cause the hand and placenta to be expelled. A movement of the hand, or friction, or gentle thumping with the fingers upon the internal surface, will promote the contraction, when it is but feebly manifested, or excite it when it is tardy in commencing.

Should the placenta be removed, while the stricture partially remains, the hand had better be reintroduced and the dilatation completed by a renewal of the expanding process, after which general contraction of the longitudinal and other fibres, should be induced as just directed. Should this precaution be neglected, the uterus may contract irregularly, and be the cause of protracted suffering to the patient, before it shall attain its normal status.

Notwithstanding, in a case of complete hour-glass contraction,

the stricture may be very rigid and apparently unyielding, very few who have attempted its dilatation in the manner above described, have not been perfectly astonished, and delighted with the facility with which it yields to the means employed. Even those who recommend waiting, and opium, bleeding, bathing, friction, etc., in case they fail, which they generally do, resort to this expedient as a *finale*. Why not employ the most certain means, for the relief of the patient first, and save her a great deal of unnecessary anxiety, and at the same time enhance her safety? When there is unusual resistance manifested, and the stricture refuses to yield to the simple process recommended, the finger may be smeared with the extract of belladonna, and then introduced, this application generally overcomes all resistance.

Sometimes a portion of the placenta is found to occupy the stricture, forming the hour-glass contraction, and is held firmly and immovably in its grasp. This need not in any wise complicate the case, nor cause a deviation from the ordinary mode of procedure. Two or three moderate attempts might be made towards disengaging it, by making gentle and steady traction upon it, and the cord at the same time, if practicable; if otherwise, let the traction be made upon either the cord, or that portion of the placenta that is found protruding through the orifice. In either case, there should not be force enough applied to rupture the one nor lacerate the other. When it is discovered that these efforts are made in vain, that there is no advancement perceptible, but that the mass remains immovably fixed, the dilating process as above recommended should be instituted at once, the stricture enlarged and the placenta removed; after which uniform contraction should be induced, as heretofore directed. During the operation an assistant should make pressure upon the abdomen with both hands, for the purpose of steadying the uterus.

While this course of treatment, for hour-glass contraction, is at variance with that recommended by some eminent authors, it is nevertheless supported by others equally distinguished. Among the latter may be mentioned, Rigby, Ramsbotham, Dewees, and other celebrated obstetricians, both European and American.

Dr. Dewees directs that the woman should be placed upon her back, with the legs drawn up, and knees separated, preparatory to the operation; a position similar to the one he recommends for turning, or the application of the forceps.

So far as our own experience goes, we have never found a more favorable position for the introduction of the hand, and the dilatation of the stricture in hour-glass contraction, than that usually selected for obstetrical manipulations.

SECTION II.—ABNORMAL ADHESIONS OF THE PLACENTA.

Perhaps the term cohesion is more expressive of the normal relation existing between the placenta and uterus, than any other that can be employed, inasmuch as it is merely a sticking together of the two bodies, without an intermingling of tissues, or an agglutination of structures. It is frequently found that this cohesion is much stronger in some instances than in others. Sometimes it is so considerable that it resists the uterine action, when not interfered with, for several hours after the birth of the child, rendering the interposition of art necessary to effect a separation. This, by the inexperienced practitioner, is often mistaken for *morbid adhesion*. We have often felt it difficult to repress the smile of incredulity, when we have heard the implausible obstetrical bantlings boasting of their success, in managing cases of adherent placentæ. Very often they represent that their first case in obstetrics proved to be one of abnormal adhesion, and that several times subsequently they have encountered the same difficulty. It is somewhat remarkable that the more experience they have in superintending the duties of the lying-in chamber, the less frequently they meet with this trouble, and by the time they have practised a quarter of a century, they are ready to admit, that they have never met with a single ease in their lives. By this time they begin to learn that the accident is of very rare occurrence, and that with many, it is never encountered in a long life of obstetrical practice.* Nevertheless it occasionally exists, and constitutes the most formidable and dangerous cause of retained placenta; with which it behoves every accoucheur to be thoroughly conversant.

Cause. There are many fancy notions entertained in reference to the cause of abnormal adhesions, such as "fibrous transformation of the cellular filaments," "degenerations of the placental tissue itself," various osseous and calcareous concretions," etc. That these conditions may be incidentally co-existent with morbid adhesion of the placenta, there is not entertained the least doubt; but that the adhesion is dependent upon them for its existence is quite a different matter. It is more consistent with our notions of pathological phenomena, to regard the fibrous transformation of the cellular filaments, and the degeneration of the placental tissue as collateral effects of the cause producing the adhesion, and that the various osseous and calcareous concretions are but incidental deposits, found very often in the absence of morbid adhesion, and frequently absent in its presence, showing that though they may

* Statistics show that one case of morbid placental adhesion occurs in about every three thousand six hundred and seventeen (3,617) labors, and that one out of about every six, terminates fatally.

be sometimes co-existent, they are by no means always relatively connected.

That these adhesions occur in conformity with the workings of a universally recognized and well understood physiological law, that of reparation, can admit of no dispute. All injuries, as incised or lacerated wounds, ulcers, abscesses, or any other circumstance that may cause a solution of continuity of structure, or a destruction of tissue, are repaired by the deposit of plasma, or coagulable lymph; and it is known that a degree of inflammatory action is required to effect this effusion or exudation of plastic lymph, called in surgery adhesive inflammation. While the reparation of injuries is due to the legitimate operations of this beneficent law, and the perpetuity of animal existence is dependent upon it, its misdirected agency is often fraught with the most disastrous and fatal results. All are familiar with the fact, that different parts and organs often become so firmly agglutinated together, after an attack of inflammation, that the line of separation can scarcely be distinguished between them, giving the organism the appearance of one structure. Thus in pneumonia, it is not rare to see the pulmonary and costal pleuræ become inseparably adherent; also the abdominal viscera, as the result of peritonitis, frequently becomes so agglutinated together, that the stomach, intestines, liver, pancreas, etc., all present the appearance of one homogeneous, inseparable mass. Other instances of similar results might be cited, when the exuding plasma, during inflammatory action, is productive of mischievous consequences, as for instance, in inflammation of the mucous lining of the trachea, or croup, the plastic exudation is deposited in the air passages, constituting the false membrane, causing death by suffocation. In this instance we have a beautiful and striking example between the harmonious and discordant operations of a most important and indispensable law governing the animal economy. In the one instance, it is salutary and life preserving, and in the other vicious and death inflicting.

That morbid placental adhesion is induced through the agency of the same law, it would be folly to deny, in view of the numerous instances of similar results, arising from the same cause, and the fact of such consequences being the inevitable result of inflammatory action. While this is abundantly sufficient to explain the cause of these adhesions, it is also ample to account for those altered conditions of the placenta itself, that have been regarded as the causes of the adhesion. The organization of the plastic lymph, diffused through the mass, would produce those "fibrous transformations of the cellular filaments," and the "degenerations of the placental tissue itself," as certainly and effectually as it would cause the adhesion of two bodies or parts, that lie in contact with each other. So far, then, from these being the cause of

the adhesion, they can only be viewed, in common with this, as the result of inflammatory action.

This inflammation may arise from various causes, as blows, falls, or other injuries received by the uterus during pregnancy; or the persistent irritability of the part, during the development of the placenta, may render it liable to morbid changes from the effects of cold, or almost any other constitutional disturbance, resulting in inflammation. Simple congestion of the uterus, at the point of the placental attachment, may cause the exudation of lymph sufficient to produce adhesion of more or less intensity. The irritation caused by the presence of "various osseous and calcareous concretions" may possibly result in congestion or inflammation, and thus sometimes become indirectly the cause of adhesion. Let the cause of the congestion or inflammation be what it may, one thing is certain, there can be no morbid placental adhesion in its absence, any more than there can be adhesions of the thoracic or abdominal viscera without it.

Symptoms. Sometimes symptoms, giving rise to a suspicion of morbid placental adhesions, may be observed for weeks or even months in anticipation of the expected labor.

A persistent pain, of greater or less or variable severity; or continuous soreness, sometimes better, sometimes worse, in some part of the uterus, as in one side or the other, or anteriorly or posteriorly; not changeable, as regards its locality, but permanent; is indicative of a chronic inflammation of the part complained of, which may be that occupied by the placenta; and if so, morbid adhesion is very likely to be the result, for, during this inflammatory action, whether it involve the placental or uterine structure, the plasmatic exudation is deposited between the placenta and uterus, where it becomes organized, which completes the adhesion, wherever the exudation takes place; this is sometimes partial, only occupying a portion of the placento-uterine junction, and sometimes general, making the adhesion complete, throughout the whole extent of the union.

After the birth of the child, and two or three sharp contractions, if the placenta be found not to descend, but is retained up in the cavity of the uterus, it is very suspicious that the cause of the retention is morbid adhesion.

And if, by drawing upon the cord, with reasonable force, the placenta refuses to yield to the traction, but suddenly recedes upon relaxing the tension put upon the cord, it is evident that it is held *in situ* by some unusual means of attachment.

But a certainty of the cause of retention is only attained by introducing the hand into the uterus, and following the course of the cord, up to its origin in the placenta, when a knowledge of its position and exact condition may be acquired, by instituting a proper search for its attached or loosened edges.

Where morbid adhesion is suspected in a woman, in whom it is known to have existed before, the suspicion is strengthened, because some seem to be predisposed to it, as there are those in whom it occurs in every successive pregnancy.

Treatment. Sometimes, abnormal adhesions of the placenta are complicated with hour-glass contractions, or an atonic condition of the uterus. Where the first obtains, the spasmodic contraction must be overcome in the manner already described; and, in the second case, the uterine action must be aroused by friction, and such other means as have been advised, for the purpose, several times heretofore. We have also mentioned that the adhesion may be general or partial. When it is general, whether complicated with either of the foregoing difficulties or not, the hemorrhage attending it is not so considerable as where the partial occurs under the same circumstances; for the greater the surface denuded by the separation of the placenta, the greater the hemorrhage, under any circumstance of retention. Where a partial separation is complicated with hour-glass contraction, or where it occurs in connection with the normal action of the uterus, the hemorrhage may be considerable, though it may not prove alarming or dangerous; while a partial adhesion, complicated with uterine inertia, constitutes the most hazardous and frightful condition in which the puerperal female can be placed; and the less the point of attachment, the greater the danger. Cases are recorded of fatal hemorrhages, where the point of adhesion has not exceeded in size that of an English shilling.

In abnormal adhesion of the placenta, whether hemorrhage, convulsions, or any other cause of complication be present, or where it be wholly uncomplicated, the only means worth recommending, is the introduction of the hand, and the separation of the parts, by breaking up the adhesions by force.

In case of retention, from simple uncomplicated adhesion, the cord must be enveloped in a cloth, to prevent its slipping, and grasped in the left hand, while the right one is to be introduced into the vagina and made to follow its course, until the hand comes in contact with the placental mass, which may be distinguished by the cord terminating in it, and by its presenting a vascular, elevated mass above the surrounding surface of the uterus, etc. When found, search must be made for the edges, which sometimes constitute the only adherent part, the remainder of the uterine surface being normally attached; or, it may be adherent by a part of the circumference only; or, the entire periphery may be loose, and the adhesion may involve, to a greater or less extent, the central portion; or, it may be adhered in patches, each one of small dimensions; or, it may be confined to one spot, not larger than a dime. There may be as great a difference in the degree of inten-

sity, as there is in the extent of the adhesion. Sometimes it is so imperfect, as to yield to the slightest force applied; while again, it is found to be so firm, that its separation, without lacerating the uterine structures, is attended with the greatest difficulty. Experience, however, shows that a medium between the two extremes most frequently obtains.

Let the extent of adhesion be great or small, and the degree be slight or firm, the means of overcoming the difficulty above mentioned, is the only one to be relied upon.

It will be recollectcd that the hand, introduced by following the cord, will be conducted within the sack, with the membranes between it and the uterine walls. This position is very unfavorable for successful manipulation with the placenta. Previously to introducing the hand for work, the membranes must be sought for, and the hand passed up exterior to them, and in direct contact with the walls of the uterus. The thinness of the membranes will not prevent the cord serving as a guide, as in the former case. When the hand is brought to encounter the placenta, and its adhering surface, the process of separation must be consummated by tearing up the adhesions throughout their whole extent. Where the density is so great as not to admit of this being done, the placenta must be peeled off with the finger-nail, little by little, until the whole mass is separated. Where the adhesion is still firmer, and the two structures seem to be so thoroughly coalesced as to form but one tissue, the separation must be attempted by tearing off the placenta as close to the adhesion as possible; in doing this, portions of the latter will, necessarily, be left incorporated with the uterine substance, which must be picked off as clean as practicable. The portions that are left will subsequently slough away. It is desirable to obviate this, as far as possible, to prevent the supervention of inflammation. During the bloody operation, all possible haste should be made, lest the patient die from hemorrhage before the work be completed. In order to enhance her chances for life, her strength must be supported by the occasional administration of stimulants; cold applications should be constantly kept to the abdomen, and a strong sinapism between the shoulders. Internal astringents, among the most effectual, is the solution of the per sulphate of iron, which should be exhibited in doses from ten drops to half a fluid drachm, or in such quantities as the stomach will bear, *pro renata*. After the work of separation has once been commenced, it should not be suspended until completed, when the hand must be withdrawn, bringing with it the placenta, or such parts of it as may have been detached. If, however, attacks of syncope, or other symptoms of imminent danger should supervene during the attempt, and the hemorrhage be copious, the practitioner must exercise his own judgment in regard

to the safety of his patient, whether it will be enhanced or diminished by his continuing with or desisting from the operation, from time to time, by way of respite. In conducting the operation, care should be taken not to inflict injury upon the uterus by contusions or otherwise, as such may result in inflammation, that may give much trouble, or even prove fatal.

When the adhesion is complicated with inertia of the uterus, great caution is required, not to make too strong traction on the cord, as such an effort would be likely to provoke inversion, which would add to the existing difficulty, another serious complication.

Upon the removal of the placenta, efforts should be made to contract the uterus as quickly and thoroughly as circumstances will allow, after which the bandage should be applied, some proper nourishment allowed, and perfect rest enjoined.

While one hand is engaged in separating the placenta, the other should be employed in steadyng the uterus, by making appropriate pressure upon the abdomen.

The usual obstetrical position, is as convenient a one, for the operation, as can be selected.

PART TWELFTH.

EMBRYULCIA.

Embryulcia, from $\epsilon\mu\beta\rho\nu\omega$, *embryon*, “embryo,” “foetus;” $\epsilon\lambda\xi\omega$, *elkeo*, “to extract;” “to draw asunder.” A surgical operation by which the foetus is extracted by appropriate means, when a faulty conformation or other circumstances prevent delivery by the natural efforts.

The signification of this term has generally been restricted to those operations where the foetus is extracted piecemeal, or in parts, as they are removed by dissection, but its etymology enjoins no such restriction. The literal meaning of the term is, to extract or draw the foetus, without regard to the means employed, whether they be manual or instrumental, and in this enlarged sense, it is our purpose to employ it. Hence we use it as a generic term in which is comprehended all obstetrical operations, employed to extract the foetus, whether simple or complicated.

CHAPTER I.

MEANS EMPLOYED TO AVOID THE MAJOR OPERATIONS IN OBSTETRICS.

PROMPTED by the highest feelings of humanity, accoucheurs have always advised the exercise of the greatest ingenuity, in devising means for averting a resort to those destructive agencies, in effecting delivery, that must necessarily compromise the life or safety of either mother or child, when the powers of the organism, or the conservative resources of art are not competent to consummate the work. It is with the view of bringing some of the expedients resorted to for this purpose, before the mind of the student, that we refrain from proceeding at once, with a description of the operation of

obstetrical surgery. And as everything which has a tendency to preserve life, diminish danger, or to alleviate the sufferings of child-bearing, cannot but be highly interesting to the young practitioner of the art, we trust we shall be discharging a very acceptable duty, in so doing. While all the means employed to this end, are not as efficacious as might be desired, many of them have been found to be in a measure reliable, and to some extent successful.

SECTION I.—REGIMENT, AS A MEANS OF CONTROLLING THE GROWTH OF THE FœTUS.

Inasmuch as the fœtus in utero derives its nourishment directly from the fluids of the mother, and that its growth and size are presumed to be in exact ratio to the amount and quality of that nourishment, it has been held that the ingesta taken by the mother determines the thrift and proportions of the fœtus.

But to this proposition there may be taken some very grave exceptions, as it is known that thin delicate women who are unable to take more than a very moderate quantity of food, and that of not a remarkably nutritious character, and those who have become thin and feeble from protracted disease; as long standing dyspepsia; phthisis pulmonalis; the peculiar sickness of pregnancy which sometimes continues unabated during the whole of gestation, incapacitating the patient from taking and retaining any considerable amount of food, and those subject to anorexia from various other causes, have given birth to well grown and fully developed children. It seems so arranged that the fœtus must have its required amount of sustenance whether the mother gets hers or not; and if she is unable to supply the demand from the ingesta consumed by her, it will extract from her fluids and at the expense of her organism, the physical sustenance necessary for its existence and growth. The reverse of the proposition is equally true, that the fœtus will appropriate no more than is required for its sustenance and growth; that large robust women and those who indulge inordinately in the good things of life with an appreciative appetite and keen relish, and who increase in flesh from twenty to thirty pounds during pregnancy, seldom bring forth children above, and often below the medium size, showing that a parallel between the quantity of food taken by the mother and the growth of the fœtus is not a necessary result, and that utero-gestation is not under the exclusive control of the amount of nutrition enjoyed by the mother, be it much or little. Baudelocque was first to enunciate views similar to the above, and they had the effect to dispel the idea of employing regimen as a means of overcoming the difficulties arising from contractions of the pelvis. Attempts, however, have since been made to revive the scheme, and the statements

made by some more recent writers of their experience, seem to give it the appearance of being somewhat successful. M. Moreau and E. Depaul have spoken in favor of its efficacy. Dr. Ritter succeeded in reducing the size of two children in one woman, who had previously to adopting the regimen, been delivered of a number with great difficulty and still born. Those in whom the reduction in size had been effected, were delivered with much less difficulty, but they were still born also; this may have been owing to the presentations; one presented by the feet and was delivered spontaneously, but perished before the head was extricated from the pelvis; the other was an arm presentation and was delivered by turning, the head being assisted with the forearms.

The means resorted to were repeated bleedings from about the fourth month of gestation, the use of a slightly purgative mineral water, a severe diet, composed chiefly of a small quantity of vegetables, milk, bread and fruits; without meat, eggs or dried vegetables. Dr. Holeombe, in a letter to Dr. Dewees, relates several cases in which a medicinal regimen proved very satisfactory to him. He states that children that would have weighed ten pounds at birth, have been so restricted in their growth that their weight would not exceed half that amount; and relates several instances in proof of his assertion, wherein their safety was not jeopardized, nor the health of the mother seriously impaired; notwithstanding such a course as he pursued would in these days be regarded by many as highly detrimental to the health and well-being of both mother and child.

The first case he relates was that of a woman thirty-two years of age, with a considerably distorted pelvis. She had passed through two labors, one at term, after sixty hours, delivered with the crotchet; the child weighed ten pounds and a half. The second was at eight months; the foetus perished at seven months, and when expelled, was in a state of putrefaction, nevertheless the labor was protracted, severe and difficult. The third pregnancy was attended nearly from the first with symptoms of general dropsy, "which required for their suppression the daily use of medicines during the whole period of gestation, particularly a pill composed of calomel, squills and digitalis. The calomel kept her system almost entirely under the mercurial influence; and the squills and digitalis assisted in nauseating her stomach from day to day." At term she gave birth to a healthy child that weighed four pounds and a half, the labor lasting but five hours. The difference between this labor and the two first, and the size of the children was referred to the treatment to which the mother had been subjected, and the doctor resolved to test the accuracy of the conjecture by direct experiment, as soon as a proper case should be presented. One soon occurred. A woman pregnant with her fourth child, had lost three,

two of them by instrumental delivery. With the prospect of having an easy labor and a living child, she readily consented to submit to treatment. Commencing the course at about the fourth month, she continued it perseveringly until the close of gestation, when she was delivered without difficulty of a healthy living child, weighing between five and six pounds; the three previous ones ranged from ten to twelve. The effects of treatment in this case was considered decisive, as a subsequent pregnancy in which it was refused, terminated in a very severe labor, which was aided by the use of ergot, and after forty hours duration resulted in the birth of a child weighing eleven pounds. "Since this case, several other women have submitted to medicinal regimen and the result has been uniformly the same; the children in every case being considerably reduced in size but born alive, and to all appearance, with unimpaired health and constitution." Another case in which was effected a most remarkable modification in the development of the foetus, by the use of medicinal regimen, is given by Dr. Holcombe where the child, without the regimen being used on the part of the mother, weighed fourteen pounds, and was delivered with the greatest difficulty by embryotomy. At the close of the next pregnancy in which treatment had been used, the child weighing but four pounds, was expelled after a few pains, notwithstanding it was a breech presentation.

To illustrate more fully his practice, he details his treatment in a single case as follows:

"June 1, 1819—Mrs. _____, aged twenty-four years, is pregnant with her fourth child—has lost three children—owing, I was told, to their uncommon size, and her contracted pelvis—is supposed to be about four months advanced in gestation—is willing to submit to any kind of treatment, however severe, to procure an easy labor, and be the mother of a living child. Let her take a pill of the following prescription, morning, noon, and night, take also, twice a week, forty drops of laudanum, and be bled every month.

"R. squills, 48 grs. calomel, 18 grs. digitalis 6 grs. Make twenty-four pills."

"August 1st. Has taken the pills with a few short intermissions, very regularly—mouth slightly sore—appetite impaired—feels feeble and dejected, but is willing to persevere in the treatment. Has taken the laudanum and been bled twice.

"Let her take three grains of squills, night and morning, laudanum three times a week, and continue the bleeding. As soon as the mouth is well, resume the calomel and digitalis."

"October 1st. Resumed the calomel and digitalis, August 10th, and has continued the calomel, with short intervals of omission, constantly since; has omitted the digitalis every other week. Continue the treatment, increasing the squills as far as the stomach

will bear. Omit the digitalis. Take fifty drops of laudanum every other day."

"November 17th. Delivered yesterday, after a labor of six hours, of a plump, healthy-looking child, weighing five and a half pounds. Her other children averaged ten pounds."

We are not informed in regard to the character of the diet, exercise, etc., prescribed in the above case, but from the impaired appetite and feeble and dejected state of the system, presume that the regimen in these respects was such as to co-operate with the medical treatment, in producing the results desired.

The doctor says if he had the management of a case of more than usual deformity of the pelvis, he would commence the treatment as soon as conception was fully ascertained, and put the patient under a full course of various medicines, particularly of opiates and mercurials, which he would urge throughout gestation, as far as a prudent regard for the mother and child would permit.

He declares his object, in adopting this practice, to be: to derange digestion and keep the liver in a constant state of morbid excitement, stating that he has collected a number of cases of very small children, following bilious and other fevers, in which much medicine, particularly mercury, has been used. He also avers that habitual opium-takers likewise bear small children.

One of M. Dupaul's successful cases was conducted as follows: Soups formed the basis of her diet; vegetables once a day; meat once a week, and in very small quantity; half a pound of bread daily, including that in the soups. The first bleeding at three months, a second at six, a third at eight, and the last one at eight and a half months. Fourteen ounces of blood to be taken at each time.

M. Delfraysse recommends the administration of iodine during the last two months of gestation. One woman, with a contracted pelvis, had been delivered three times of dead children, after very severe and painful labors. In two subsequent pregnancies, and during the last two months, she took every morning six, and afterwards eight drops, of the following mixture:

R. Iodine, pure,	grs. xv.		
Iodide Potassium,	$\frac{3}{2}$ i.		
Distilled water,	f $\frac{2}{3}$ i.		M.

She was delivered spontaneously of living children, one of these twenty-two ounces, and the other twenty-three, less than their predecessors.

It cannot be doubted that such depleting and debilitating agencies may, under some conditions of constitution, or particular temperaments, so far control the growth of the foetus as to prevent its attaining its full weight, by a few ounces or pounds, and enable

it to pass, with facility and ease, through a pelvis too contracted to transmit one of full-growth, without causing great and protracted suffering to the woman, and jeopardizing its own life. But that they are sufficiently reliable to be depended upon, as a rule, to overcome even the minor difficulties arising from the slighter degrees of pelvic distortions, authors with great unanimity deny. This denial is based upon actual observation and experiment. Had the failures that have been made in such experiments been related, with the same care and precision that characterize the records of the successes, the comparison between the two results would be most unfavorable to the latter. There are but few practitioners who have not, from time to time, had occasion to resort to such means, for the relief of the agonies of child-bearing, and who, after being inflated with the hope of success, by reading the reports of favorable cases, have been overwhelmed, with their patients, in disappointment and chagrin. Very few, of the thousands of experiments that terminate in such results, are ever placed upon the record. We are here reminded of a remark we once saw in print, in relation to the success attending the use of a certain quack medicine, which was, that "the names of the cured are all recorded, but nothing is said of the killed and wounded."

Indeed, the sufferings and privations incident to such a course would be too great to be endured, even if assured of the happiest result; but when uncertainty is added to the other personal sacrifices, it is more than should be required, or than can be borne with becoming equanimity or forbearance. The desire for a speedy and comfortable accouchment, and the gratification of her yearnings for maternity, are inducements strong enough to sustain a woman under any burden of suffering and sorrow, and would afford her strength to endure this trial of her womanhood, without a murmur, could she but have the assurance, that in the end she would be blessed with an easy delivery and a living child. But this she cannot have.

For the following suggestion we are indebted to our friend and colleague, Prof. Buckman:

"The modes proposed for retarding the growth of the foetus, necessarily jeopardize the future health of the mother, and that of the child as well. Under the theory of Dr. Chapman, a more desirable mode suggests itself, in the repeated application of heat to the spine, by which the nerve centres, being stimulated to an increased activity, contract the capillaries, and thereby cuts off the supply of blood to the foetus, increases innervation, and promotes the exercise of the functions of the womb; but the supply of blood to these structures being diminished by these influences, there is necessarily a diminished nutrition, and a retarded growth, proportionate to the extent of the influence maintained. The

fœtus can grow only from a free supply of blood, and when this is diminished its growth is necessarily diminished also."

SECTION II.—PREMATURE DELIVERY AND ABORTION.

The books abound in discussions in reference to the propriety, morality or humanity of inducing premature delivery, in which we have no inclination to engage, and do not purpose to indulge. When the necessity arises, from a contraction of the pelvis, unavoidable hemorrhage, or any cause that threatens the life, or tends to compromise the safety of the woman, there can be but one opinion in regard to the duty of the practitioner, and that is to pursue such a course as will secure her against the menaced danger, and at the same time to protect the life and well-being of the unborn fœtus as far as practicable; but we can conceive of no instance when her life, vigorous in health, and valuable in its relations and surroundings, should be put in jeopardy to save its life, when there is no certainty but it may perish with hers, and if not, must necessarily be so circumstanced as to render its continuance exceedingly doubtful; to say nothing of its utter want of comparative value in its relations to the world around it.

As allusion has often been made to this expedient, through former parts of the work, in connection with the circumstances and cases to which it is applicable, we shall not refer to them again in this place, but proceed at once to the consideration of the various modes that have been adopted by different practitioners, and recommended by authors, for the accomplishment of the work.

When the conjugate diameter of the pelvis does not exceed three and three-quarter inches, and is not less than two and a half inches, premature delivery is not indicated, because a living child of usual size, at nine months, may be delivered in the former instance; and a living one, at seven months, cannot pass in the latter. As this expedient is resorted to with a view of preserving the life of the child, and at the same time, of guarding the mother against the dangers of parturition at term, it is not to be attempted before the close of the seventh month; notwithstanding the age of viability is at the end of the sixth month, according to French law. It is very seldom indeed that the child survives its birth many days, when born much before the close of the seventh. At that time, the biparietal, or short diameter of the fœtal head, or that which corresponds with the antero-posterior or short diameter of the pelvis, is two and three-quarter inches; this, with the compressibility with which it is largely endowed at this period, owing to the smallness and mobility of the bones, enables it to pass a two and a half inch antero-posterior diameter, even with the soft structures of the head and pelvis intervening.

Abortion, like premature delivery, is now accepted as an obstetrical operation, and since 1756, has received the sanction of nearly all the practitioners of Europe and America. As it does not contemplate saving the life of the foetus, it may be employed when the contraction of the pelvis is below two and a half inches in its smallest diameter, and under all other circumstances when the induction of premature delivery is justifiable, occurring before the close of the seventh month. This proposition, according to some authors, requires considerable modification. But we cannot realize a condition requiring premature delivery for its relief, that would not justify abortion, when found to exist at an earlier period of gestation. Unless the danger be imminent in the former instance, it should not be employed, and where it is imminent in the latter, it should not be neglected. We are not unmindful of the claims of the foetus upon our care and protection, but we are not so tenacious in regard to its life, as to allow that of its mother to be endangered, that it may stand a mere chance of being preserved.

The same means may be employed to provoke an early expulsion of the foetus, whether it be after the end of the seventh month or before; but as the primary object in preferring premature delivery to abortion, is the preservation of the life of the foetus, much more care is required lest it be destroyed by the harshness of the means employed, acting directly upon its organism in utero, or be caused to perish from the action of the uterus during its expulsion.

The first step to be taken in the work under consideration, is to gain the free and unconditional consent of the woman. It is for her to decide the question, after being fully informed of the probabilities of success on the one hand, and the possibilities of danger on the other, whether she will submit to the necessary treatment or not.

Various drugs, reputed as oxytoxics, have, from time to time, been employed to excite early uterine contraction, sometimes for legitimate purposes, by conscientious, professional men, and sometimes with criminal intent, by non-professional persons, to conceal their shame, or to escape the cares and responsibilities of increasing families; among these, may be mentioned the spurred rye, black hellebore, oil of tansy, oil of savine, the colocynth, or bitter cucumber, and, more recently, the Indian hemp and gossypium herbaceum, or cotton root. Some of these are comparatively inert, while others, in over-doses, act with great violence. Some women, oppressed with poverty, and cursed with unkind and brutal husbands, at the prospect of additional family cares, in their desperation have taken large quantities of stimulating essential oils and drastic purgatives, and madly rushed into the jaws of death, in their attempts to escape the increasing duties of an extended maternity, which, under the forlorn circumstances surrounding them, are too onerous to be borne.

Where the necessity exists for the induction of abortion or premature delivery, no intelligent practitioner will think of relying on the uncertainty of any drug or nostrum, however much its properties may be extolled, or the certainty of its action asserted; for he must know that the local uterine action can only be a secondary result, when excited through the general system; even ergot, as we have elsewhere stated, as prompt and powerful as it is in promoting uterine contractions when once induced, is among the most tardy and inefficient means of exciting them. Where the uterus is thus aroused out of its quiescent state, it is not until the general system is brought thoroughly under the influence of the drug, and even then, its specific action is by no means certain, except in cases of labor, under the action of ergot and a few other oxytoxics. It is of daily occurrence, that poor, heart-broken, sorrowing woman, is drugging herself to death, hour by hour, with every nostrum that rapacious quackery may offer, or gossiping friends recommend, with the hope of falling upon something, eventually, that will relieve her present and prospective troubles. But the result is usually the same, whether directed with skill and judgment, or ignorance and empiricism, that a persistent attempt to excite the expulsive efforts of the uterus, by means of drugs, will end in disappointment, impaired or ruined health, and not unfrequently, death itself.

There is an obstetrical maxim, that it is well should be borne in mind, which is, that no medicine can affect the safety of the foetus, in utero, without jeopardizing the life of the mother.

Abdominal friction, tittilation of the os uteri, warm bathing, warm sitz-baths, electro-magnetism, plugging the vagina, etc., have all been attended, perhaps, with more or less success, as they have all had their advocates, and some of them yet have their defenders; but they have proved themselves to be uncertain, and, of course, unreliable.

The only plan of inducing abortion or premature delivery, that is entitled to any confidence, as being sure and unfailing, is the mechanical interference, either directly or indirectly, with the integrity of the ovum.

1. The first means we shall notice, of acting directly upon the ovum, is that recommended by Dr. Hamilton, which consists of introducing the finger, or a flexible catheter, above the os internum, and separating the lower segment of the ovum from the uterine walls. It will be found, that but a few cases will admit of the passage of the finger above the internal os, at the end of the seventh month; and, moreover, the elevated position of the uterus at that period of gestation, would render it very difficult to reach that portion of the cervix with the finger; and the separation of the ovum, as above stated, by means of a catheter, can have no effect in ex-

citing uterine contractions, because the relation existing between it and the uterine structure, is not even that of contact; for the two layers of the decidua intervene between them, and the uterine layer of this only lies in contact with the uterus; there are no organized adhesions to disturb; it is only an instantaneous separation of the contact, which is resumed again, immediately upon the passage of the instrument around, and can produce but very trifling irritation at most. We concur most fully in the remark of Cazeaux, that "it is highly probable that, in those cases where this plan appeared to answer, the success was rather owing to the irritation at the neck, caused by the introduction of a foreign body, than to the detachment itself."

3. Other means of acting directly upon the ovum, consists in uterine injections and the uterine douches. The first, which was brought forward by Dr. Cohen, of Hamburg, consists of introducing a canula about eight or nine inches in length, provided with an opening about the eighth of an inch in diameter and curved at the end, rather more than a female catheter, so that it can readily follow the curve of the pelvis and cervix uteri, two or three inches above the os internum, to the outer end of which is attached a syringe containing about two ounces of tar water, which is injected carefully and slowly into the uterus; the syringe is then removed, and the canula gradually withdrawn. In ten to fifteen minutes the patient may rise from her bed, and walk about at pleasure. Should no appearance of labor follow, in six hours, the injection must be repeated. This is said to be prompt in its effects, and devoid of danger.

It has not been tried sufficiently often to test its reliability, as a single successful experiment it appears constitutes Dr. Cohen's whole experience in it; but from its alleged harmlessness it may be worthy of further trial.

The uterine douche is due to the sagacity of Professor Kiswisch, and consists in directing a stream of warm water, say at about 76° or 78° Fahrenheit, upon the neck of the uterus. It can be readily applied by means of a very simple apparatus. Take any vessel, an ordinary wooden bucket or keg, capable of holding eight or ten quarts of water; let a hole be bored, in or near the bottom; to this let a long flexible tube, provided with a stop-cock, about a foot from its free extremity, be attached; this extremity should terminate in a gum elastic canula, with a single opening about the sixteenth of an inch in diameter; the force of the stream may be increased or diminished by varying the size of the opening. Let the vessel thus provided be elevated seven or eight feet above the patient, who should lie or sit on a mattress or lounge, provided with an oil cloth or gum blanket, so arranged as to allow the water to escape into a tube or other suitable vessel prepared to receive it. After making the

foregoing arrangements, the woman should be placed in position ; on account of effectiveness, the recumbent is preferable, but in view of convenience, the sitting posture will be chosen. One or two fingers of the left hand is to be introduced to the cervix uteri, to guide the canula, which the operator directs with the right hand ; when ready the cock is turned by an assistant and the water let on. The douche will be continued for ten or fifteen minutes, and repeated three or four times a day, but in cases of urgency, a more frequent application will be admissible.

A greater or less number of applications will be required, occasionally labor pains are perceived after the second or third douche. Kiswisch has brought on labor after the fourth application, and has been obliged to repeat it as often as eighteen times, but according to his observations the aggregate number of douches is ten. The mean time from the commencement of the operation to the delivery of the child is about three and a half days, although it has produced its result in twenty-four hours, and has been prolonged to seven days.

This plan though preferable in some respects to many others that have been recommended, is better adapted to hospital practice than to use in private families. Its preference consists in its harmless effects upon the organism of the mother, the membranes of the ovum, and the foetus, and where it is employed to effect premature delivery, with the view of saving the foetus, its safety becomes its chief recommendation.

4. The only certain mode of inducing premature labor, is by puncturing the ovum, and allowing the waters to escape. And for provoking abortion at any time during gestation, before the end of the seventh month, the same manœuvre is equally reliable ; and very early, even during the second month, when the sack is so small and the liquor amnii so scarce, as to render its puncturing difficult and uncertain, the breaking up of the rudimental structures that are about forming within the uterus, will prove equally efficacious in arresting the process of gestation, and causing the expulsion of the embryo.

After the celebrated consultation of most of the eminent physicians and surgeons of England in 1756, which resulted in recommending the induction of premature labor or abortion by puncturing the ovum as the necessity of either might exist, as a legitimate obstetrical operation, the first case in which it was deemed necessary, fell under the care of Dr. Macauley, who at the time was physician to the British Lying-in Hospital, in Brownlow street, London, and colleague of Dr. W. Hunter. The operation proved successful, and was shortly followed by those of Dr. Kelly, who performed it three times upon the same woman, and twice the children were born living.

While the male metallic catheter, the instrument frequently recommended by authors as being well adapted to the end in view, is not far from the proper size; its great curvature renders it very inappropriate to the work. The canula, suggested by Cazeaux,

FIG. 97.



CANULA AND STILET
AS RECOMMENDED
BY CAZEAX.

that is sufficiently curved to correspond with the line of the pelvic axis and of twelve or thirteen inches in length, furnished with a stilet, having its point concealed, is far preferable to the catheter and all that is requisite for the accomplishment of the work. (Fig. 97.) The canula should be made of silver, and should have soldered on each side of the free extremity a small silver ring, for the purpose of distinguishing between the convexity and concavity of the inner end when it is introduced. The end for introduction should be furnished with a small opening to allow of the passage of the point of the stilet, when necessary. The stilet should be made of steel, and the part designed to occupy the curve of the canula should be made flat, elastic, and to possess about half the curve of the canula; the point should not be sharp but rather dull and rough; it should be calculated rather to lacerate than pierce the membranes; the portion designed for the cavity of the canula should be two or three lines longer than the latter. Its outer extremity should be flattened out, so as to form a handle to it and should be provided with a shoulder or rest, to prevent its being pushed through the canula further than a given distance.

Different positions are advised for the patient during the performance of the operation, as the erect, sitting and recumbent; but there is no one more convenient, nor less liable to exposure than that usually occupied during parturition. This being selected, the fore-finger of the right hand is introduced to the os uteri, and made to serve as a conductor to the instrument which is directed by the left hand.

The point of the stilet must be entirely concealed by drawing it back a few lines, to prevent its catching into or injuring the surfaces over which it is conducted. The convexity of the curve must be placed towards the sacrum, and the concavity behind the pubis. The instrument must be introduced from before backwards, *i. e.*, its free extremity is to be well inclined towards the abdomen, and the other passed along the finger until it arrives at the tip, when it is slipped into the os; after passing into the cervix to the extent of three quarters of an inch or an inch, the free extremity is to be carried backwards towards the perineum, and a

very moderate upward pressure made at the same time. By this movement the curve of the canula is brought in correspondence with the axis of the longitudinal diameter of the uterus, and the inner extremity passes the internal os, and enters the uterine cavity. No obstruction encountered by the instrument should be attempted to be overcome by force. Where the woman has borne children previously, there will not be experienced the least difficulty in introducing the instrument; but where the os and cervix uteri have not been dilated by previous expansion, there is sometimes more or less perplexity experienced in getting it to enter the small circular orifice, and to pass the internal os; but this is only when the attempt is made to induce abortion in the early months of pregnancy. At the end of the seventh month no such difficulty need be apprehended, as the dilatation of both orifices is sufficient to allow the canula to pass with the greatest care. The chief embarrassment at this period arises from the height of the os uteri in the pelvis, which renders it almost inaccessible to the finger and which can be overcome only by persevering efforts.

No more force should be applied in introducing the canula into the uterus than is required to pass the catheter into the bladder; and where opposing obstacles, which seem to prevent the advance of the instrument, cannot be overcome by proper address, it had better be withdrawn and a smaller uterine sound introduced first, after which the canula can be made to pass with comparative ease.

After the instrument has been introduced two or three inches above the internal os, and care taken that the extremity is not in contact with the uterine structure, the stilet is to be pushed through the canula, so that its point may encounter the membranes of the ovum, then by several smart rotatory movements, carefully made with the instrument, the laceration of the membranes will be effected and the liquor amnii pass through the canula. The stilet should be withdrawn a little two or three times during the operation so as to remove the shoulder or rest from the canula, and allow the contained liquor amnii to escape, which will be positive evidence that the work has been accomplished. The patient should be interrogated frequently, after the point of the stilet has been thrust through the canula, if she feels any pricking or scratching sensation in the uterus; if she does, it is proof that the uterine wall is being injured instead of the membranes, and is suggestive of the necessity of turning the point of the instrument in an opposite direction.

After the membranes shall have been ruptured, as announced by the discharge of the waters through the canula, the instrument is to be slowly withdrawn, and the woman allowed to move about at pleasure.

In about twenty-four or thirty-six hours after the puncturing of

the ovum and the letting off of the waters, labor-pains begin to become manifest; this is often attended with rigors, followed by fever, headache, and constitutional symptoms of greater or less severity. At other times, the constitutional disturbance is quite inconsiderable, so much so as to cause little or no inconvenience. In about twenty-four hours from the first incursion of the pains of labor, the delivery will be complete; so that the time intervening between the operation and termination of the labor, seldom exceeds forty-eight hours, and occasionally that space of time is considerably diminished.

In consequence of the large proportion of silent births that resulted from this mode of operating, and the failures of complete success of the plan, in so far as they occurred, which were referred to a tardy dilatation of the os uteri, and prolonged pressure upon the foetus, by excessive uterine action, and the long absence of the liquor amnii, many accoucheurs had entirely rejected the perforation of the membranes, when Meissner of Leipsic proposed a modification of the operation, which had the effect of preventing the occurrence of accidents, and of restoring it again to general favor. He suggested that the ovum be punctured as high up in the fundus of the uterus as possible, and invented an instrument for that purpose. By this plan, he designed the liquor amnii to escape only in quantities sufficient to excite contractions, and at the same time to retain enough to protect the foetus from excessive pressure. As we have just intimated, this plan was attended with almost universal success, and soon received the preference over all others, for inducing premature labor. The instrument designed for the purpose is an ingenious but rather complicated affair, possessing no appreciable merit over the one we have described. With a little care the latter may be passed up between the membranes and the uterus until it reaches the fundus, when the end can be turned to the ovum, and the point of the stilet thrust out, and brought into contact with the membranes, which will readily yield to the movement, necessary to secure their laceration, as above described. Care must always be taken to so direct the point of the instrument as not to injure the uterine walls. The short distance the point of the stilet is made to escape from the canula, is designed to prevent its injuring the foetus. The safest course to pursue is, not to press the instrument, with the point of the stilet exposed, against any resisting substance whatever. The membranes offer no resistance, and anything that does, must be either the foetus or uterus.

On account of the number of failures to attain the full amount of benefit, hoped to be derived from puncturing the membranes, anterior to the modification introduced by Meissner, in regard to saving the children, those who rejected this mode of inducing pre-

mature labors, conceived the idea of acting on the ovum indirectly through the contraction and dilatation of the uterus, without interfering with it by any direct means, and this way retain the liquor amnii, to protect the foetus from undue pressure, until a full dilatation of the os uteri was effected, and the labor so far advanced as to allow of its escape, without injury to the foetus. For this purpose the introduction of a foreign body into the cervix uteri was proposed. It was maintained that its presence would cause a contraction of the uterine fibres, and contribute to the mechanical and physiological dilatation of the os uteri. Kluge is accredited with the authorship of this mode, which is still preferred by many practitioners, both foreign and native. The body introduced consists of a sponge tent, formed by taking a conical piece of very fine dry sponge, about two inches in length, of a size corresponding to the orifice of the os and cervix uteri. In one who has given birth to a child or children before, it will be required to be larger than in one who has not. The sponge is to be trimmed off as smoothly as possible, and then covered with a thin coating of beeswax. The small end is to be reduced to a blunt point, and the large one left from a quarter to half an inch in diameter. To this extremity is to be attached a piece of cord or narrow tape, six or eight inches long. Sometimes the condition of the os and cervix uteri, at the end of the seventh month, is such as to require a very much larger tent than the one just indicated. For this or any other purpose, where a dilatation of the os and cervix uteri is necessary, a piece of gentian root, of due length and properly shaped, is far preferable to the sponge tent—it never becomes offensive and is equally expansive.

For introduction, the woman is to be placed in the most convenient position, either upon the back, in the posture for turning, or using the forceps, or on the side; we should prefer the latter. The finger is then introduced to the os uteri, and if it be found deviating from the middle of the pelvis, in any direction, it, with the cervix, must be drawn to their normal position. The operator may avail himself of the use of the speculum, in adjusting the cervix uteri, and introducing the tent if he chooses; but to one accustomed to touching, it would be a useless incumbrance. The cervix having been brought to occupy the median line of the pelvis, the tent is taken by its base, in a pair of long curved forceps, and conducted up to the os uteri, where it is inserted, and gradually pushed into the cervix, assisted, if necessary, by a partial rotatory motion. The fore finger of the right hand serves as a guide to the tent, while the forceps carrying it, is held there by the left.

Having succeeded in inserting it as far as practicable, it should be held there a few minutes, say five or ten, when the forceps and speculum (if used) are to be withdrawn, and the vagina filled with

any appropriate material, such as is generally used for tamponing in cases of hemorrhage; the whole to be retained by a T. bandage, and the patient to be kept in a recumbent posture. Such is the course generally recommended by authors, for keeping the plug in the cervix uteri, but is very properly objected to, by Cazcaux, who says: "The necessity of plugging the vagina, and keeping the tampon applied for two or three days, and sometimes even longer, occasions great suffering to the woman." He had an instrument constructed in 1845, which was designed to supersede the use of the tampon for keeping the tent in the cervix uteri, and which he avers succeeded admirably. From his description of it, however, we should infer that it is rather complicated, and in no wise superior for the purpose to the spiral spring pessary, invented by Mrs. Brigham, of New York city. By this simple contrivance, the tent can be retained in situ, and the woman enjoy the privilege of locomotion during the time required for its continuance.

The sponge or root tent by being introduced dry, absorbs the moisture which permeates the thin wax covering, of the sponge (the root requires no such coating), becomes saturated and distended, which tends to a gradual mechanical dilatation of the os, but which acts much more effectually as a dilator, by exciting the motor nerves of the uterus through reflex action, and thus by inducing contractions, institutes all the phenomena of parturition. Should the tent fail to excite the contractions, according to expectation within twenty-four hours, it must be removed by means of the cord or tape, and a larger one introduced. Premature labor induced by this method, approaches perhaps nearer a natural one in its phenomenal characteristics, than when brought about by any other means; but upon the whole, it is not so satisfactory as those induced by puncturing the membranes, according to Meissner's modification. The latter being more speedy in its action, more certain in its results, and equally successful in reference to the foetus, is likely to be most generally resorted to whenever the induction of premature labor becomes necessary.

Another means of acting upon the ovum indirectly, has grown out of the investigation of the ganglionic nervous system, by Dr. John Chapman, of London, which consists of the application of the ice-bag to the lower portion of the spine. The application should continue for two or three hours at a time, and be repeated twice a day. This is said to act with great promptness and certainty in exciting uterine contractions, so much so as to render its use inadmissible in cases of pregnancy, when otherwise it would be strongly indicated. In amenorrhœa, dysmenorrhœa, and various other forms of ovarian and uterine disorders, it is said to act very beneficially and promptly; and when injudiciously applied, has manifested equal power in promoting accidental abortion and premature labor. Its

powers might no doubt be as efficiently invoked legitimately as they have been employed casually in terminating gestation prematurely.

CHAPTER II.

MANUAL EMBRYULCIA.

AGREEABLY to the definition of the term, *manual embryulcia* comprises all those cases where assistance is given in the labor, by any traction or extractive force applied to the child by means of the hand, whether in a great or small degree. But it is not in reference to those instances where assistance is rendered to a minor extent, which every humane accoucheur feels impelled to afford, through sympathy for his patient, and that is not absolutely demanded by the urgency or perils of the case, that we purpose here to speak. These have already been fully considered, in connection with the different circumstances pertaining to them, that have been under discussion in former parts of the work.

Such labors as are rendered essentially dystocial, from the presence of some unusual condition, whereby the life or safety of mother or child, or both, is put in jeopardy, and which requires the interposition of manual assistance, to guarantee immunity from danger, are those to which the term *manual embryulcia* is strictly applicable. The most important manual operation comprised in this term, that is not unfrequently resorted to for the relief of some of the graver difficulties of parturition, is described in the following section :

SECTION I.—DESCRIPTION OF TURNING, OR VERSION.

The mere shifting of the head or breech to a more favorable position in the brim of the pelvis, in case of a faulty presentation of either, does not constitute turning, in its technical sense.

Turning, in obstetrics, is susceptible of two definitions, each having a distinct and specific meaning.

1. Where either the cephalic or pelvic extremity of the foetus is brought, by the aid of the hand, into the circle of the pelvis, in transverse presentations, or other serious difficulties, and where no other unfavorable condition exists requiring speedy delivery, but where the labor may further be safely trusted to efforts of the

organism. To this manœuvre, the term *version* might be appropriately applied.

2. Where circumstances render it necessary that the uterus should be speedily emptied, without reference to the presentation, and where the child must be turned and delivered by the feet.

The operation of turning, practised in the present day, appears to have been unknown to the ancients. A few scattered allusions to it may be found in such of their writings as have been transmitted to us, as being applicable to the dead foetus. It is mentioned by Aspasia and Philumenus, who are quoted by Cetius, and but for whom, their names would have been unknown to earth at this time. Perry Franco, in his work on surgery, published in 1561, revived it, publicly, after many centuries of oblivious repose; not, however, until Ambrose Paré had put it in practice in 1549. Paré, it appears, preferred the cephalic version, as he recommended turning with the head foremost, where it was possible. He practised turning by this mode for hemorrhages and convulsions. Francis Mauriceau, a man of great learning and experience, gave some valuable improvements in the operation, in his work published in 1668. But Philip Peu, in 1694, and William Manquest de la Motte, in 1721, did more to render the operation what we find it at the present time, than did all their predecessors and contemporaries.

As every case of dystocia, in which turning is indicated, has been studied in its appropriate place, and as all the circumstances favorable, or adverse to the operation, in each instance, has been fully considered in their proper connections, we have nothing remaining to do but to proceed at once with a description of the operation.

Whether, then, as the result of a consultation, or the immediate urgency of the case, turning having been determined upon, and the consent of the woman obtained, the accoucheur will, with as little parade and display as possible, and with a desire to create in her mind no undue excitement, proceed to make the *necessary preparations*, which consist in having her placed on her back, across the bed (a mattress is far preferable), with the perineum brought over the bed-rail two or three inches; the bed or mattress, with the materials for protecting it against the discharges, should be drawn an inch or so over the edge of the rail, so as to prevent her coming in contact with the hard wood; her head and shoulders should be so elevated as to relax the abdominal muscles; a rug should be placed upon the carpet, by the side of the bed, upon which should be placed a vessel, immediately under the perineum, to catch the discharges as they escape. Two chairs should be placed by the side of the bed, upon which to rest her feet; these should be far enough apart to allow room sufficient for the accoucheur to take his posi-

tion between them ; each knee should be supported by an assistant. Before commencing the operation, the rectum and bladder should be evaeuated, if they had not been before. In order that the patient may be kept perfectly quiet, and free from suffering during the operation, it would be advisable to administer an anæsthetic, and to keep her under the influence of it during the process. This should be placed under the charge of a competent assistant. The muscular relaxation induced by this agent, supereedes the necessity of resorting to venesection for that purpose, as formerly practised, when it was thought that the operation might be opposed by the rigidity of the parts.

The position of the accoucheur, is between the chairs occupied by the woman's feet, and it is for him to elect whether he will occupy the sitting or kneeling posture; this election will however be influenced to a greater or less extent by the height of the bedsteads. If they are of the ordinary height, or unusually low, he will find the kneeling posture be more convenient, for this purpose a pillow should be provided for him to kneel upon. This precaution is necessary, as kneeling upon the hard floor becomes very fatiguing and painful, when continued a long time, which is sometimes necessary to be done, when the operation is delayed by contractions, and other opposing influences, which are often present, and required to be overcome before the task on hand can be consummated.

The choice of the hand to be employed is determined by the presentation ; and the one selected, that will pass with its palmer surface, next to the abdomen of the foetus. In the first, or left occipito-acetabular presentation, the left hand will have to be used. In fact in those presentations where the anterior surface of the foetus looks towards the right side of the mother the left hand must be used, and where it looks towards the left side, the right hand must be employed. This is necessary so that the feet can be brought down in front of the abdomen, and the body made to bend in harmony with its natural curve. If the feet were brought down over the back, the foetus would have to be bent backwards, which would be almost certain to produce a dislocation of the spine, and at the same time, put the uterus in jeopardy of being ruptured, as very much more space would be required, to turn it in this direction, than anteriorly.

While it is all important that the proper hand should be used, for the presentation to which it is applicable, we cannot conceal the fact, that it is one of the most difficult things in obstetrics to distinguish the presentation, before the head engages in the superior strait, and while the membranes remain entire. It is not always the most easy matter imaginable, for the young practitioner to detect it, under the most favorable circumstances, and when the labor is far advanced, and it is much less so, when the foetus is floating in the liquor amnii above the brim of the pelvis.

But it cannot be considered good practice, to allow the woman to lay, unassisted, and let her life flow away with relentless hemorrhage, or expire amid a hurricane of convulsions.

It is known that a very large majority of cases of labor are with the first presentations, and without delaying to ascertain the precise position of the head, it would be safe to proceed at once with the left hand, and if, after being introduced, it should prove to be the wrong one, withdraw it and introduce the right.

The time for operating is when the os uteri is fully dilated, or very dilatable, and before the membranes are ruptured ; it often occurs, however, that the rupturing takes place before the os uteri is in a condition to allow of the introduction of the hand ; where this is the case, the operation should not be deferred, after dilatation takes place, if the head remains disengaged from the inlet, though it may be attended with more difficulty than it would have been were the membranes entire.

All the preliminaries being arranged, the parts favorably disposed, and the conditions demanding the operation, present, the accoucheur must withdraw his coat, take his position, denude the arm that is to be employed, lubricate it and the hand well, and also the external labia, upon their external and mucous surfaces, with soft lard ; the hand must then be placed into the form of a cone, by putting the ends of all the fingers and that of the thumb together, then introduce the apex of the cone between the labia ; and by gradual upward pressure, and a boring motion with the hand, push it through the vaginal orifice into the cavity ; at this point the greatest difficulty will be surmounted, when the knuckles pass through the orifice. Pass the hand up to the os uteri, and let this opening be entered in the same manner, with the hand in the conical form ; another slight difficulty will be encountered as the knuckles engage in the os, unless it be in a very relaxed condition indeed, but generally, it is more easily overcome, than that met with at the mouth of the vagina. It has been said elsewhere that though the os uteri be not extensively opened, nor yet exceedingly distensible, yet if it be found to yield to a moderate degree of force, such force is justifiable, when the necessity for turning is urgent. Under such circumstances the resistance to the passage of the knuckles, will be more stern, but it can be overcome by a persistent effort, which should not fail to be made.

The attempt should be made to introduce the hand in the absence of pain ; but the contractions of the uterus do not interfere with the passage of the hand into the vagina, and if they are found to impede materially its entrance through the os uteri, the effort must be suspended, until the pain subsides, when it must be immediately renewed, and continued determinedly until again arrested by the recurrence of pain ; and so must the work be persevered in until

the object be fully attained. After the hand has once gained the cavity of the uterus, it must be passed up, with its palmar surface over the face, breast, and abdomen of the foetus, towards the fundus, in search of the feet, which, when found, are to be grasped by the ankles, one between the thumb and fore-finger, and the other between the fore and ring-fingers, and the hand closed upon them. This grasp being taken above the malleolar processes, gives a hold sufficient to enable the accoucheur to bring down the feet to the os uteri, and even through it, without changing it or being embarrassed by its slipping.

During the search for the feet, the hand should act only in the absence of the contractions, and its presence often excites them in rapid succession, so that very little time can be gained to work, consequently that occupied in the operation is proportionally prolonged. Sometimes two or three hours are consumed in effecting delivery by turning. It is not unusual for the membranes to give way during one of these contractions, and the liquor amnii to escape, though this accident be an unfortunate one; for now the uterus contracts down upon the body of the foetus, which very much impedes the movements of the hand, and adds to the delay in the operation. The accoucheur must not desist from his purpose, but persevere, carefully and steadily, until his object be accomplished. The membranes, whether ruptured or not, will, from their tenuity, offer no resistance to grasping the feet, as just directed.

In these protracted efforts, the hand often becomes so cramped and fatigued that it is rendered entirely useless. When this is the case it must be withdrawn and, by rest and friction, restored to its normal condition; after which it is to be returned to the cavity of the uterus, to resume its mission there. This process will, in some instances, be required to be repeated several times during one operation. While this unavoidable delay occasionally attends an attempt at turning, it is, on the other hand, often accomplished in a few minutes.

After the feet are seized they must be brought down gradually and steadily; all jerking and irregular motion must be avoided. The turning movement must be made in the absence of pain, as a disregard to this rule might cause a rupture of the uterus. It may become necessary, to facilitate the movement, to place the thumb upon the forehead, and push up the head as the feet are brought down. For this purpose an instrument, called the elevator, was formerly used. The feet must be brought down in front of the abdomen, with the toes directed towards it, until they are made to pass through the os uteri into the vagina, thence through the external parts. If the case is not urgent, and the contractions vigorous, the remainder of the labor may be entrusted to the un-

assisted efforts of the organism. But if danger be apparent, traction upon the delivered parts must be continued, and the labor terminated by artificial means, the arms and head to be extricated according to the directions in pelvic presentations.

In describing the position to be occupied by the woman during the operation, we have followed some of the leading authorities; but, according to our own experience, the usual obstetrical posture affords equal conveniences and facilities with, if not superior to, the one indicated, and is attended with much less parade and ceremony, a desideratum by no means to be disregarded.

Where simple version is to be performed, in case of transverse presentation, or from other causes, the hand must be passed into the uterus, according to the rules laid down for that purpose in turning, and instead of passing it up towards the fundus, in search of the feet, it must be employed, in the absence of pain, in shifting the foetus, so as to bring one extremity or the other, either the head or the breech, which ever appears to be the most readily done, into the circle of the superior strait. It must be borne in mind, that in this attempt the operator is often aided, to an astonishing extent, by the spontaneous efforts of the uterus; and in shoulder presentations, it should not be forgotten that great dependence must be placed in the postural treatment, as given while considering spontaneous versions, for assistance in effecting either the cephalic or pelvic version of the foetus. Turning must always be performed under cover.

CHAPTER III.

INSTRUMENTAL EMBRYULCIA.

INSTRUMENTAL embryulcia embraces all such cases as require the aid of instruments to effect delivery, whether they be compatible with the life of the child and the continuity of the maternal structures or not. Inasmuch as the instruments employed in obstetrics comprise those that are denominated non-cutting and cutting, or harmless and destructive, we shall divide instrumental embryulcia into two classes, each to be distinguished by the character of the instruments employed to extract the foetus. Cases that require the non-cutting, or harmless instruments only, as the forceps, vectes, blunt hook and fillet, are denominated those of pacific instrumental embryulcia. Those that require the cutting, or de-

structive instruments, as the perforator, crotchet, scalpel, etc., are designated as pernicious instrumental embryulcia.

SECTION I.—PACIFIC INSTRUMENTAL EMBRYULCIA.

Forceps. As we are now about to introduce to the student the use of the polished metal, to assist him in his humane exertions to relieve the sufferings, avert the danger, and, perhaps, snatch from an untimely grave a beloved and estimable fellow being; one around whom cluster all the affections of the heart, and in whose situation are concentrated the hopes, fears and anxieties of the household of which she forms the centre and the light, let us be cautious, wise and prudent, lest the first impression we make upon the mind of the young aspirant for professional fame, be of an injurious cast. We would most earnestly and religiously insist upon it, that the young practitioner be not tempted, by the glittering bauble of momentary glory, to fall into the miserable and pernicious error that characterizes the obstetrical practice of too many physicians at the present day—that of the useless employment of instruments, for the sake of imposing upon the credulity of simple-minded, confiding woman, and gaining a sort of popularity, that is as ephemeral as it is disreputable.

The value and beneficence of the obstetrical instrument is only exhibited where the powers of the organism fail to consummate nature's grandest and proudest work. When this occurs, the employment of extraneous resources is justifiable, and not till then. When dangers lower around the couch of suffering, and death threatens the subject of anguish and sorrow, to extend the hand of science, strengthened by experience, to direct the proper instrument, and rescue the perishing sufferer, is to perform an act that is godlike in its results, and beatific in its effects. Such an act entitles the performer to the gratitude of the race, and to a place upon the roll of imperishable fame. But the knavish mountebank that will seize upon this agency for good, and prostitute it to the purposes of fraud, and the ends of selfishness, and to the infliction, perhaps, of life-long injury on his confiding victim, deserves the execration of all mankind.

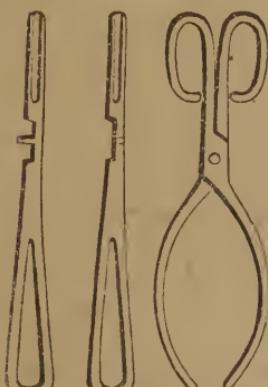
A brief historical sketch of the forceps is given in the introduction of this work, in which is noticed some of the kinds of extractive instrument used generally before the invention of the modern forceps, by a member, or some members of the Chamberlain family, in England, prior to the year 1650. The exact date of this invention is not, nor probably ever will be known, in consequence of its being kept a secret by its author or authors, for a long time. In 1673, the secret was sold to three Dutch practitioners, viz.: Rodger Roonhuysen, Cornelius Bökeman, and Frederick Ruysch,

the celebrated anatomist. In their hands, and in those of their successors, it remained a profound secret until 1743, when it was purchased by two Dutch physicians, Jacob de Visscher and Hugo Van de Poll, for the purpose of making it generally known. But, instead of receiving the genuine forceps, for which they contracted, they got only a flat bar of iron, somewhat curved at each end, a mere lever. It was afterwards proved, by direct evidence, that the article purchased was a *forceps*, the blades of which united at their lower end by means of a hinge and pin, and out of this, the last purchasers were defrauded.

At Woodham, Mortimer Hall, near Mildon, Essex, an estate which formerly belonged to the elder Chamberlain, purchased by him some time previously to 1683, not many years ago (1814), was found by Mr. Kemble in an old box, in a secret closet, a collection of obstetrical instruments, among which were several forceps, of different sizes, two of which appear to have been used in actual practice. This collection is said to be now in the possession of the Medico-Chirurgical Society of London.

The annexed figure, represents the fashion of the forceps, which had evidently been secreted by Dr. P. Chamberlain, and which appears to be a great improvement upon the instrument possessed by Hugh Chamberlain at Amsterdam, and which he there sold to the three speculators; it is said to have consisted of two flat bars or blades of iron somewhat curved towards the ends, and fastened by

FIG. 98.



THE CHAMBERLAIN FORCEPS.

a hinge arrangement, while in those found at Woodham, the blades were fenestrated, and remarkably well formed. The blades were designed to be introduced singly and then secured by a lock, which consisted of a pivot riveted into one of the blades, and made to pass through a hole in the other, where they crossed each other, like the blades of a pair of scissors. In the smaller forceps there is merely a hole in each blade, at the place of crossing, through which a cord is passed, and then wound round the shanks of the blades to keep them together. The handles are fashioned like those of a pair of tailors' shears.*

About the time the profession was first enlightened in regard to the use of the forceps there appeared several claimants for the honor of the discovery, among whom may be mentioned the names of Chapman, Giffard, Drinkwater, Palfyn, Ledoux, and others. But the possession of the secret, by the Chamberlains, long before it was divulged, or implied or thought of by any one else, determines them to be the originators of

* Rigby's System of Midwifery.

the idea, and the first to have reduced it to practice, and would have entitled them to an enviable distinction among the benefactors of the race, had they not allowed, the glory of the discovery to be eclipsed by their parsimony and thirst for lucre. Most of the early professors of the forceps, were guilty of the same reprehensible trick; even Levret consented to play the quaek for *l'Argent*.

While the conception of a pair of artificial hands, to be introduced one at a time, and made to grasp the head of the foetus, and extract it, in cases of difficult labors, was a grand intellectual feat, the artistic accomplishment of the work must be acknowledged to be of the most primitive order. The instrument was brought to the general notice of the profession, in the early part of the eighteenth century, when improvements commenced being made upon it in workmanship and design. Dr. Edmund Chapman claims to have originated the lock, but in this he was evidently anticipated by the Chamberlains, as it was present in those found by Mr. Kemble, concealed in the closet, where they had remained undoubtedly for half a century. The forceps in use prior to 1752 contained but one curve, which was the lateral one, when the blades were placed together; that is, the blades were concave on the inner side, and made to adapt themselves to the head of the foetus; externally they were convex laterally, and made to accommodate themselves to the shape of the pelvis, on this account it was called the straight forceps, and was only adapted to use, when the head was very low down, after it had rotated, and the occiput been placed under the arch of the pubis. About this time Levret of Paris, and Smellie of England, conceived the second, which has been called the *pubic curve*. Its design is to adapt the instrument to the head of the foetus when it is up in the curve of the pelvis, and even at the superior strait; to either of which positions the straight forceps is not applicable. The new curve comes under the pubis, when the instrument is introduced, and being suited to the curve of the pelvis, admits of the blades passing up much higher than the straight one is capable of doing. The priority of the invention of this improvement has been awarded to Levret, but as he kept it a secret, it is declared that Smellie had no knowledge of its existence, until he produced it himself. To both of these eminent accoucheurs therefore is accorded the credit of the discovery. To attempt to follow all the changes in shape and fashion, some, perhaps important and some unimportant, to which this instrument has been subject, at the hands of the many who have essayed to improve it, since the invention of Levret and Smellie, would be to engage in a work that would prove more prolix than profitable. According to the estimate of Velpeau, there are at present near one hundred species of forceps in the possession of the profession. There is not the least doubt that even that number, and more, have been in use at differ-

ent periods since the introduction of the new curve, but very many of them have gone into disuse, leaving but a comparative few, that are considered of any material value at the present day.

Two styles of locks appear to have been adopted, for keeping the blades or branches together when under use, at a very early date in the history of the instrument; one consisted of a notch or hole in the one blade, and a screw pivot in the other; the second style consisted in a deep groove in each blade, the shanks of which fitted into each, forming a lock; while the fitting of the pivot of the one, into the notch or hole of the other, at the point of the crossing of the blades, form the lock in the first variety. These means of rendering the blades immovable upon being used, continue to be employed at the present time. The first, or notch and pivot, is known as the French lock, and the grooves as the English lock.

There is also a nationality represented in the handles of different instruments, the wooden handles represent the English, and the metallic ones the French. The wooden handles were probably first introduced into England by Smellie, and have ever since continued to distinguish the English forceps. The forceps of Giffard and Dr. Edmund Chapman contemporaries with the Chamberlains, terminated in blunt hooks, those of the former curved inwards, those of the latter outwards, which form of handle has been retained in the French forceps ever since. Though originally English, it has been adopted by France, to the extent of making it national. In this country both styles of locks and handles are used; our inventors and improvers, adopting either, agreeably to their fancy or notions of superiority.

There are two species of forceps, the *long* and the *short*. The one is represented by the long French forceps of Pean, or Baudelocque, and the other by the short forceps of Davis. These furnish the extremes between which range many varieties of length. Some are midway between the two, from which the varieties diverge towards either extreme; so that in this country, which is fruitful in inventions and improvements, there is a great lack of uniformity in regard to the length of the instruments found in the shops of the manufacturers, made according to the notions of the different improvers. In some the English lock and handles are employed, in others the French; in others again we find the French lock and English handles, and *vice versa*.

The long instrument is designed to deliver where the head is high up in the pelvis, even at the superior strait, but it is not disqualified from acting efficiently, when the head is at the outlet. The short forceps is designed to disengage the head when at the inferior strait only, and was formerly devoid of the second curve, the straight instrument being deemed all-sufficient for this purpose, but at present very few indeed of the single curved forceps is met with.

The forceps consist of two parts, called branches. These are distinguished as the right and left, or male and female. The branch that contains the pivot is the right or male one, and that which contains the notch is the left or female. These branches, when joined together, constitute the instrument.

The blades constituting the short forceps, or those having the English lock, are only distinguished as the right and left, they having neither pivot nor notch by which their sex is indicated.*

We shall only mention in particular two or three varieties of forceps, which may be taken as types of the others.

As has been already intimated, the forceps is divided into three sections, viz.: the handles, joint or lock and clams or blades. The handles are, of course, the part held in the hand when used. The joint or lock is the part at which the branches are held together when in use. The blades or clams are the portion that is adjusted to the head when in service.

The different species of instruments are derived from the modifications of these different sections.

That powerful instrument, that is in use by many of the older practitioners in this country, known as *Baudelocque's forceps* (Fig. 99) is exactly 18 inches in length from the hooked extremity of the handle to the end of the clams or blades. About midway in the length of the branches is a flattened plane, in one of which is the screw pivot and the other the notch which form the lock or joint. The fenestra, the open space in the blade, is 6 inches long and near 1 inch in width at its broadest part, tapering down as it approaches the shank to but 3-10ths of an inch in width. When the handles are closed the points of the blades approach each other within $\frac{3}{8}$ ths of an inch. The greatest distance between the blades, when the handles are closed, is less than $2\frac{1}{2}$ inches. When the instrument is adjusted, locked, that is, when the flattened surfaces come together squarely, and the pivot enters the notch, the pivot is turned, so that it screws down upon the other branch and holds it fast. The ends of the branches curve outwards, and serve as a blunt hook. The instrument weighs 2 pounds and 7-8ths of an ounce. The instrument, on account of its great strength and the immense leverage it affords, is capable of accom-

FIG. 99.

PEAN'S OR BAU-
DELOCQUE'S FOR-
CEPS.

* There is a disparity among authors in reference to which is the right and left branch. Velpeau calls the pivot branch the left, and the notched branch the right; while Madame La Chapell reverses them. There is no more necessity for this difference than there is for a difference of opinion in regard to the right and left hand. The blades or clams being the part designed to be introduced, and to grasp the head, they are essen-

plishing much good or harm, as the hands that use it are skilful or otherwise. It was used and strongly recommended by our former instruetor and friend, the late Dr. Dewees; and most of those who received instructions from that distinguished teacher and author, from a quarter to half a century ago, adopts it, and has continued its use ever since. But it is liable to objections on account of its weight, size, and the amount of pressure to which the foetal head is exposed from its use.

FIG. 100.



DAVIS' SHORT FORCEPS. is $\frac{7}{8}$ ths of an ineh. The greatest breadth of the blade is $2\frac{1}{8}$ inehes, of the fenestra $1\frac{1}{2}$ inehes. The width of the bars enclosing the fenestra $\frac{3}{8}$ ths of an ineh. The thickness of the iron part of the handles is $\frac{1}{2}$ an ineh at the lock, and tapers down to less than $\frac{1}{8}$ th of an ineh at the end. The lock consists of the grooves. The blades are distinguished by right and left. The weight of the instrument is $13\frac{1}{4}$ ounces.

The late Professor James, of the University of Pennsylvania, seldom used any other than the short handled straight forceps. Professor R. M. Huston, late of Jefferson Medical College, used the

tially the instrument. The portions designed to remain without the organism are but the handles of the instrument, the means by which it is directed and used. They are no more the instrument than the handle of a knife is the knife, or the handle of an axe is the axe, or the holder of a pen is the pen. They are an indispensable part of the instrument, but are too unimportant to constitute its prominent characteristic. The blade of the pivot branch forms the right side and is of course the right branch. The branch taking its character from its most important part, and the notched branch, forms the left side, and is the left branch for the same reason.

short German forceps of Siebold; and Professor C. D. Meiggs, late of the same institution, recommended and used Davis' forceps. The example and influence of these eminent teachers have done much to establish the use of the short forceps among the practitioners in this country.

Hodge's Philadelphia Forceps (Fig. 101). This instrument which, as a long forceps, has supplanted that of Baudelocque for the last quarter of a century in this city, and within the influence of the University of Pennsylvania, in which institution its inventor was for many years the distinguished professor of obstetrics, and the immediate successor of Dr. Dewees, is a very fine one, and in every respect superior to its French prototype; being much less in all its proportions it is far more convenient and from its mechanical conformation is infinitely better adapted to the shape of the head, and to its delivery from any point in the pelvic canal. Its entire length is 16 inches, its length from the joint or lock to the end of the blades is $9\frac{5}{8}$ inches; shank from lock to blades $3\frac{1}{2}$ inches; of blade 6 inches; of fenestra 5 inches; from lock to handles $6\frac{1}{2}$ inches; greatest distance between the blades at the middle of the anterior curve; from the upper edge of the bar bordering the fenestra of each blade $2\frac{1}{2}$ inches; from the lower edges of the same bars $2\frac{3}{4}$ inches; between the anterior edges of the bars forming the posterior boundary, the fenestra of each blade $2\frac{3}{4}$ inches; between the posterior edges of the same bars, $2\frac{1}{8}$ inches. This arrangement gives the blades a considerable flare from without inwardly, which adapts the instrument more perfectly to the sides of the head.

The distance between the points of the blades when the handles are closed is $\frac{1}{2}$ an inch. This instrument may be opened until the greatest distance between the blades will be $4\frac{1}{2}$ inches, while the shanks at the roots of the blades will be separated but $1\frac{3}{4}$ inches. This is wherein one of the great excellencies of the instrument consists. It is capable of being introduced and adjusted to the head at the superior strait without separating the external labia more than $1\frac{3}{4}$ inches, which does not put the least stretch upon the perineum. And the adjustment of the instrument to the head is so complete, that at most, its transverse diameter, without the least compression, cannot be increased over $\frac{1}{4}$ of an inch. So that a laceration of the perineum, which is one of the most frequent accidents attending delivery with the forceps, can only arise from gross ignorance or extreme awkwardness. The thickness of the shank is $\frac{1}{4}$ of an inch, width $\frac{1}{8}$ of an inch, width of flattened plane at the lock $\frac{1}{16}$ inch, length of

FIG. 101.



HODGE'S FORCEPS.

thumb screw pivot $\frac{3}{4}$ inch, depth of notch $\frac{1}{2}$ inch. The shank of branches are rounded to prevent pinching, etc. The fenestra is oval; hooked handles. Weight $17\frac{3}{4}$ ounces.

The older forceps were provided with a bead or eminence around the edge of the concave surface, for the purpose of preventing their slipping, but the contusion produced by it upon the head of the child, caused it to be dispensed with by direction of Professor Flamant.

Many varieties of the primitive instruments were covered with fine leather, with a view of protecting the structures from contact with the hard mettle; but the superior adaptability and the fine polish of the modern improvements, have rendered this precaution unnecessary. Besides the present denuded instruments are much more cleanly and less bungling than those. The only advantage in having the present style of forceps covered, would be to prevent the clanking of the mettle when handled in the presence of the patient, which is often shocking to the nerves of sensitive women.

Notwithstanding some instruments are superior to others in point of shape and mechanical construction, yet there is much truth in the observation of Baudelocque, that it is not so much the instrument that is to be looked to as the hand that uses it.

Action of the Forceps. From the shape of the blades the two curves and the fenestra, for the relief of the parietal protuberances, it is evident that the forceps have always been designed for the head, and should never be applied to any other part; though it has been applied to the breech in pelvic presentations, it can never be done without incurring the risk of cutting or lacerating the sides with the points of the blades, and bruising or lacerating the maternal structures.

Though in a measure a compressible instrument, its legitimate use is to act as a lever and extractor. When the head is grasped by it the former is performed by moving the handles from side to side, carefully and steadily, and the latter by making the necessary traction at the same time downwards and forwards in direction of the axis of the inferior strait. The forceps are usually applied only when the head is fully in the excavation, with the occiput under the arch of the pubis and the face in the hollow of the sacrum; the nearer the apex is to the vulva, the more readily can the instrument be adjusted; hence when the use of the forceps is clearly indicated, but the necessity for speedy action is not urgent, it would be prudent to wait until the head attain this advantageous position. It is much better and safer to submit to a little delay when the state of the case will allow of it, than to run the risk of failing in the attempt. By pursuing such a course we not only save the patient much disappointment and its consequences, and ourselves the mortification of defeat, but very often gain time by the delay. When the head has gained the position just indicated, the difficulty of ad-

justing the blades to its sides is comparatively trifling, but if attempted before that event, their proper adjustment is not so easily accomplished. If we fail in placing them accurately over the lateral surfaces, the instrument will not lock with that ease and facility that is indicative of a perfect adjustment; if we attempt to effect this by force, we can hardly fail in inflicting injury upon the foetal head, or maternal structures, or both, by the edges of the blades. As the instrument is designed for the sides of the head, their application to any other part must almost inevitably be productive of harm.

It is not always that the forceps can be applied when its use is clearly indicated; the position and size of the head may be such, that there is not room for the passage of even the thin blade between it and the pelvic structures. Address and skill are occasionally foiled in the attempt, and the disappointed accoucheur is obliged to lay by the instrument, and resort to other means of relief. Again, the distortion of the pelvis may be such as to admit of an easy introduction, adjustment and locking of the instrument, but the passage be too small to allow of the extraction of the head either by force or dexterity. Here, too, the forceps must be abandoned, and recourse had to the perforator and crotchet. Being satisfied that everything has been done that skill or science could do to avert the destruction of the foetus, the accoucheur, without any feelings of mortification or distrust, should proceed at once to save the mother by sacrificing the child.

Application of the Forceps. The application of the instrument, as here directed, is designed for the most favorable position of the head, such as has been already described. This position cannot be attained without a full dilatation of the os uteri. It often occurs, however, that while the head is fully occupying the excavation, with its occipito-frontal diameter in direction of the long diameter of the inferior strait, the os uteri, at the same time, is encircling fully one-half of its bulk. When this is the case, care must be taken that the points of the blades be passed between it and the head, lest the os and cervix be enclosed in the grasp of the instrument, which event must, necessarily, endanger the safety of the structures to a great extent, as wounding and contusing them can scarcely be avoided, under such circumstances. It is equally necessary that the relaxation of the vagina and external organs should be complete, as it is that the os uteri should be dilated, as a preliminary condition to the application of the forceps. The liability to laceration of the vagina and perineum is in proportion to the rigidity of the parts. The use of the forceps is, therefore, never justifiable, as a means of overcoming delay in labor, when such delay results from a rigid state of those organs. But, how often is science made to blush at the mutilations and sufferings

inflicted in her name by the impatience or ignorance of her professed votaries? The mania for instrumental delivery, at present so rife among practitioners, is as degrading to the profession as it is destructive to the comfort and well being of the patient.

There may arise contingencies, however, where a deviation from this rule would not only be justifiable, but imperative. Where the necessity for the use of the forceps involves the danger of the immediate loss of the patient's life, as hemorrhage, exhaustion, or any other condition demanding the immediate emptying of the uterus, the instrument must be applied, and delivery effected, even at the risk of lacerating the perineum, which, under such circumstances, becomes a matter of secondary consideration. In cases of severe hemorrhage, or extreme exhaustion, there is usually a corresponding relaxation, and the forceps can be used without incurring this risk. In convulsions, however, the contrary condition obtains, as a general rule; and if immediate delivery be regarded as necessary to rescue the patient from sudden death, there must be no hesitation in applying the forceps, though the external organs be more or less rigid. It is better to risk laceration of the perineum, than to continue the jeopardy of her life for want of immediate delivery.

Where the head is less favorably situated, being higher up in the pelvis, or at the superior strait, the os uteri must be dilated or dilatable, before any attempt at delivery with the forceps should be made. *Let it be remembered, that a complete relaxation of the soft structures of the genital passage, from the uterus, must be the essential pre-requisite to the application of the forceps.* The only exceptions to be observed, being those just stated, in regard to the vagina and external organs, the os uteri admitting of none. Nevertheless, as was stated in reference to turning, if the os uteri be in a condition in which it is sometimes found, that is, not dilated, nor yet exactly dilatable, but yields to a moderate degree of force, without resistance, and the necessity for a speedy delivery be pressing, the operation may be proceeded with, although it may be attended with more difficulty than where more favorable conditions exist.

As preparatory to the application of the forceps, the rectum and bladder must be in a state of complete evacuation. If this has not been attained by natural means, recourse must be had to the availabilities of art.

Position of the Woman for Introducing the Forceps. The position in which the woman is to be placed for delivery with the forceps, does not differ materially from that described for turning, in the preceding chapter. Such deviations from it, as may be necessary for the comfort of the patient, the convenience of the operator, or may be required by the arrangement of the room or

position of the bed, must of course be made. This preliminary measure is liable here, to the same objections, that were mentioned in relation to its adoption for turning; that is, it has the air of too great importance, and the unavoidable parade attending it is calculated to terrify a sensitive woman, whose mind is already wrought up to the acme of alarm for her own safety or that of her unborn infant. Where the head is high up in the pelvis, and the long forceps is to be used, it is certainly the most convenient position for the accoucheur, and promises the most easy and speedy delivery to the patient, for these reasons it should be adopted, notwithstanding it is not free from the objections just stated. But where the head is at the inferior strait, and has rotated, and the short handled forceps has been selected, the usual obstetrical position upon the left side is very preferable. All the preparation here required, is to draw the woman close to the edge of the bed, so that it shall not interfere with the introduction of the blades; the right knee is to be elevated to a convenient height, and supported there by an assistant, during the operation.

The mode of Introducing the Forceps. Let either of the positions just indicated be selected, that is required by the circumstances of the case and then proceed to ascertain as near as possible the exact position of the head; if it is at the inferior strait, and its diameters are in correspondence with the long and short ones of the strait; this will not be a difficult task. This determined, and the back be the position selected, the forceps, should be placed in a basin of warm water, and allowed to remain long enough to get sufficiently warm, not to cause any unpleasant feeling from their coldness; for this purpose the warm water is preferable to a fire or stove, because the warmth imparted will be more uniform, and not one part become

FIG. 102.



REPRESENTS INTRODUCING THE LEFT OR FEMALE
BLADE FIRST.

excessively heated, and another left comparatively cold, as is apt to be the case when a fire or stove is used for the purpose. It is recommended to lubricate the instrument with some soft material as lard or oil, before attempting its introduction, but generally the natural secretions at this stage of the labor, are sufficient for all the purposes of lubrications. Should these be deficient, the above recommendation should be observed, not only in regard to the instrument, but to the parts also. All the preliminary measures being completed, and the membranes ruptured, the accoucheur takes the right or male branch, in his left hand, holding it with his thumb and two fingers, as he would hold a pen, and with the ends of the fingers of the right hand separate the left labium from the head of the foetus and at the same time allow them to act as a guide to the instrument, the point of which is to be passed between the fingers and the head, the handle being carried up towards the abdomen on the right side, and then, with the exercise of a very moderate degree of force, the blade will follow the curve of the pelvis, and the handle will spontaneously descend, and gravitate, as it were, to a line in direction with the median line of the trunk, between the thighs. If the blade is properly adjusted, the flattened plane for the lock will be perfectly horizontal and the pivot perpendicular, should it fail to present this aspect, it must be slightly withdrawn and shifted until these signs of an accurate adjustment be exhibited; it would be useless to apply the second blade, while the first remains unadjusted, because they could never be made to lock in that condition.*

After the first is introduced properly, the handle is to be depressed as low down against the perineum as may be comfortable to the patient, and entrusted to the hand of an assistant; this is to promote the convenience of the accoucheur, while introducing the second blade, which is now to be taken in the right hand, as before, and with the left separate the right labium from the head, and guide the blade. The same course is to be pursued in regard to the position of the handle, as was observed with reference to the first, except it must incline to the opposite side, and as the blade passes up along the side of the head, the handle must be depressed until it comes in contact with that of the first, at the joint, where they cross and will lock readily, if the last blade has been properly adjusted to the head. The introduction of this blade is usually

*It will be perceived that in Fig. 102, which represents the introduction of the forceps, the directions given both in regard to the selection of the first blade to be introduced, and the mode of holding it, are not in accordance to the directions given; the one about to be introduced being the left or female bladder and grasped in the right hand; this being according to recommendations of some authors and teachers. By describing the mode we very much prefer, and representing the other in the drawing, it was thought the student would get a good idea of both, without being taxed with a perusal of the details of the latter.

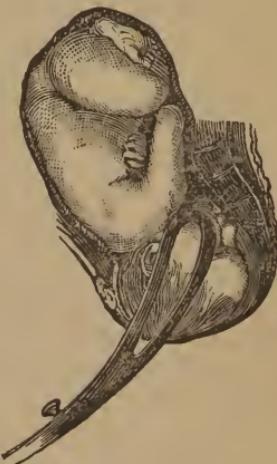
attended with more difficulty, than that of the first, notwithstanding the pains taken to prevent their interference with each other during the introduction. If the position of the second blade be not faulty, its flattened surface, at the joint, will come fairly upon the horizontal one of the first, and the pivot can be slipped into the notch with the greatest ease, when two or three turns of the screw will make them sufficiently secure. If the locking cannot be so easily effected, the last blade must be partially withdrawn, as was directed in reference to the first, and the handle elevated and depressed, and the blade shifted until the locking can be effected without using any force, as this here would be productive of injury to either the foetal head, or the woman's structures or both, from the undue pressure, or perhaps cutting, by the edges of the instrument. An easy and free locking of the branches is conclusive evidence that both blades are properly adjusted to the sides of the head, (Fig. 103,) and that nothing remains but to proceed with the extractive efforts.

The mode of holding the instrument, as above directed, between the thumb and two fingers, allows of a freer movement of the hand in giving it the proper direction, and presents the unconscious exertion of undue force, which is liable to be made when it is grasped by the whole hand. The obstructions frequently met with in introducing the blades must be overcome by shifting them; force is never justifiable.

It should be remembered that while the pivot remains perpendicular, and the flattened plane in which it is placed is horizontal, and the instrument does not lock, the fault is with the last blade introduced; and that the requisite change in positions must be made in it alone; and that no interference with the first is necessary. By bearing this in mind, much embarrassment may be avoided when the locking is attended with unusual difficulty.

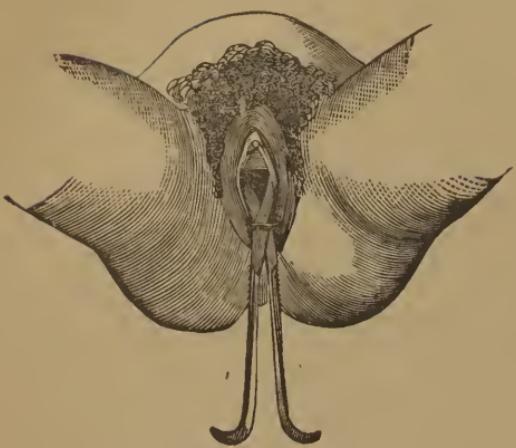
After the blades are introduced and locked, (Fig. 104,) the traction should be made by grasping the instrument at the joint with the right hand, by placing the hand on the under side of it, and extending the index finger so that the point of it shall come in contact with the head; the handles near their ends are to be held by the left hand with one or two fingers between them. This is to pre-

FIG. 103.



THE FORCEPS ADJUSTED TO THE SIDES OF THE HEAD.

FIG. 104.



REPRESENTS THE FORCEPS INTRODUCED AND LOCKED.

ment, in case it should occur; for while it remains firmly grasped by the hand, if the finger is found leaving the head, it can only be because the instrument is slipping and carrying the finger with it.

When prepared, the traction is to be made in the presence of pain, and with the coöperation of the woman, during which the handles are to be moved from side to side. As the pain subsides, all efforts must be suspended until the pain returns, when it must be renewed with the lateral movements, and so continued to aid each pain until the head escapes, when the pivot must be unscrewed and the branches removed carefully one at a time. After the head is delivered the labor must be terminated in the usual way. As the head escapes the handles must be elevated towards the pubis.

Sometimes when the pains are inefficient and far apart, and the forceps are indicated from an atonic state of the uterus, the introduction of the blades excites a renewed action, the contractions become strong and regular, and the labor soon terminates favorably, without any further effort, neither the extractive nor lateral movement being necessary. When the presence of the forceps in the uterus produces this effect it is better not to remove it until the delivery of the head is so nearly effected that there remains no doubt of its being certainly accomplished by the otherwise unaided efforts of the uterus. Then it would be proper to withdraw the blades, but should the pains cease upon their withdrawal, and the progress of the labor be arrested, their re-introduction will become necessary. It is best, therefore, not to withdraw them while there remains a doubt that the uterus will be able to finish the work unassisted. Sometimes the introduction of a single blade will produce

vent too great compression being made upon the head; for if the handles are brought together so closely as to cause injurious pressure the finger or fingers between them will be first to feel the impression, and the closer they are brought together the greater will be the pain experienced by them. The point of the index finger upon the head is to warn the accoucheur of the slipping of the instrument.

the same effect. When such is the case, the use of the second one is unnecessary.

When the pains have subsided entirely, and the introduction of the blades have no effect in exciting them, traction and the lateral movements must be made in their absence. But these are not to be persisted in continuously. They must be continued for three or four minutes, and then suspended for the same length of time, and again renewed. This alternation of effort and rest in imitation of the physiological action of the uterus, must be continued until the extraction of the head is effected.

In such an inactive state of the uterus, where no aid can be derived from its contractions, very much more strength is required than where it is capable of affording its wonted coöperation. Where the head is large, in disproportion to the straits of the pelvis, it occasionally occurs that the full strength of a strong man is hardly sufficient to overcome the resistance offered to the advancement of the head; but where the uterus is active, and we have its concurrent efforts to assist us, address and management are frequently more efficient than muscular strength. Where the short forceps are used in this position of the woman, the groove in the right branch, which corresponds to the flattened plane of the male blade of the long instrument, must be horizontal, to prove that the blade is properly adjusted to the left side of the head; and, in order that the branches lock with facility, the groove of the second branch introduced must be horizontal also. No twisting nor distortion of the branches at the joint must be attempted to be overcome by force; but, so long as the groove of the first blade remains horizontal, and locking cannot be effected, the fault is with the second one, and the shifting must be confined to it.

If the woman occupies the side position, and the right blade be first introduced, the groove must be perpendicular, to show that the blade is properly adjusted. In a word, let the position be what it may, the flattened plane in the long forceps, and the groove in the short, must be at right angles with the genital fissure, to prove that the first blade introduced is properly placed at the side of the head.

In case it becomes necessary to withdraw the blades after they have been introduced, the handles must be elevated towards the pubis, so that their curves may correspond with the curve of the pelvis, during the act of withdrawal, to avoid injury that would almost necessarily result from an attempt to remove them, in a straight line.

When it becomes necessary to apply the forceps, before the head has rotated, while it remains in the oblique or transverse position, the blades, as above directed, must be introduced, and allowed to follow the curve of the pelvis in the direction of the sides

of the head. It must not be expected that the same signs of a perfect adjustment of the separate blades will be present, as are observed where it is more favorably situated. The concave curve of the blades, instead of being under the arch of the pubis, will be inclined, more or less, to one side or the other, as the head is oblique or transverse, and as the presentation is the first or second, fourth or fifth. Let its position be what it may, the locking of the instrument remains to be the unequivocal sign, that the blades are properly adjusted.

In applying traction and the lever movement, the handles must be allowed to follow the tendency that is indicative of rotation; indeed, when it is found that the instrument is inclined to assume its relative position with the parts that are observed, when applied after rotation is complete, a little assistance in that direction will facilitate the movement, and perfect the rotation; after which the course heretofore indicated must be pursued.

Application of the forceps may become necessary in any of the various presentations of the head; but, to enter into the details of each particular case, would be to protract this article to an unprofitable extent, and to embarrass the mind of the student with minutiae that may easily be deduced from the general principles that have been laid down, as they may be applicable to cases as they occur in practice.

Delivery from the Superior Strait. When circumstances occur, requiring the application of the forceps at the superior strait, the mode of proceeding is not different from that already prescribed, further than the elevated position of the head requires a further introduction of the hand into the vagina, than where the operation is to be done at the inferior strait. The points of the fingers must be placed between the head and the cervix uteri, and the blade be passed along the palmer surface until the point passes between the fingers and the head, up into the uterine cavity; as the head is higher up than usual, the blade must be pushed further up, in order to grasp it.

The second blade must, in like manner, be introduced, and made to encompass the opposite side; the locking will be found not much more difficult than when at the inferior strait. The traction must be made in direction of the axis of the superior strait, that is as far backwards and downwards as possible.

Although the general mode of proceeding in this case is the same as when the head is at the inferior strait, the whole operation is attended with more difficulty than in the former case, because the head is further from the outlet, and is in the oblique or transverse position.

Authors speak of delivering with forceps from *above* the superior strait, but it is our notion, that this feat is easier described

on paper, than performed upon the living subject; that is, if it is meant to grasp the head while it remains wholly disengaged, and in its usual state of mobility, floating in the cavity of the uterus, it were idle to devote a moment's time in discussing the point, pro or con, or in describing the operation, as it is highly impracticable, being too difficult and dangerous, and, withal, uncertain, to entitle it to a place among the operations of obstetrical surgery. If the urgency for immediate delivery be extreme, while the head remains in this situation, the case comes clearly within the domain of turning, and a resort to instruments cannot but complicate and protract the delivery.

It should be held as a maxim, in obstetrics, that the aid of instruments should never be invoked, while the case is within the dominion of manual assistance. Their adoption arose out of the necessity of supplying a desideratum that the hand, alone, was incapable of affording; and to be viewed in any other light, is to form a mal-appreciation of their design and use.

Where the head is actually engaged in the superior strait, with the apex occupying the upper section of the excavation, and held there too firmly by the contractions of the uterus, to be elevated, filling up the circle, so as to prevent the passage of the hand, the forceps is clearly indicated and may be employed with saving advantage to both woman and foetus.

Use of the Forceps in delivering the Head after the expulsion of the Body. It may occur that after the spontaneous expulsion of the body, or after its delivery by turning, the head may be retained, from causes, for the removal of which the hand may be found incompetent; in such cases the forceps must be resorted to.

The general theory of its application here is similar to that given in relation to the vertex presentation at the inferior strait. The dorsal plane of the body will indicate the part of the pelvis occupied by the occiput; for instance if the back of the child corresponds to the abdomen of the mother, the occiput will be behind the symphysis pubis, and if it corresponds with the back of the mother, it will be in the hollow of the sacrum, and if it be to either side, the occiput will be at that side. Should the head be in any other position than with its occipito-frontal diameter in direction with antero-posterior diameter of the inferior strait, an effort should be made to rotate it and bring those diameters in harmony with each other. This may be accomplished by placing two fingers upon the side of the chin or upon the side of the head posterior to the parietal protuberance and pressing it in the direction that will most easily place the occiput either behind the symphysis pubis or in the hollow of the sacrum. If this is found to be impracticable, the vectis may be used for the purpose; it failing, the forceps must be applied to it in its unaltered position; being careful that the blades

are as nearly over its sides as possible and that the pubic curve of the instrument be so placed that it must come under the pubis during the process of extraction.

Preparatory to the application of the forceps, the body must be carried as far as possible and supported in the direction of the part occupied by the occiput, *i. e.*, if the occiput be behind the pubis, the body of the child must be carried up with the back towards the abdomen, so as to make room for the introduction of the blades which must pass in front of the chest. If the occiput occupy the hollow of the sacrum, then the body must be carried back with the neck strong against the perineum, and the blades introduced in like manner in front of the chest. If the occiput occupy either side of the pelvis as indicated by the dorsal plane, the body must be carried backwards towards that side, etc.

After the blades are applied and the instrument locked the traction and lever motion must be made as before directed. If the blades be applied with the head in the oblique or transverse position as indicated by the position of the occiput, the traction will be

attended by rotation, which must be favored by the action of the instrument and a corresponding rotation of the body.

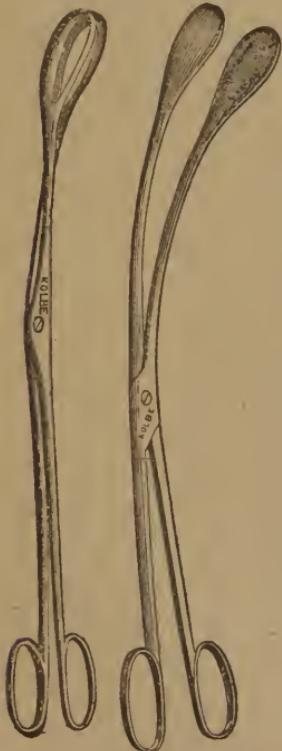
During the operation the body must be taken charge of and supported by an assistant.

It seldom occurs that the forceps are required to assist in the delivery of the head after the expulsion of the body, except in cases of deformed pelvis; and where the deformity is too great to admit of its extraction by this means, recourse must be had to embryotomy.

The Placenta Forceps. Another species of forceps is often required for the extraction of the placenta; two varieties of which are represented in Figs. 105-106. There are but few practitioners who have not been annoyed and perplexed in consequence of the long retention of the placenta, and the consequent hemorrhage, occurring after the expulsion of the foetus, in cases of abortion. Where the os uteri, is but imperfectly dilated, and the placenta is retained in the cavity of the uterus, too high up to be reached by the fingers, the medical attendant is powerless, where internal remedies fail to excite contractions

FIG. 105.

FIG. 106.



TWO VARIETIES OF PLACENTA FORCEPS.

sufficient to cause its expulsion, if not provided with the proper instrument to enable him to afford the necessary relief. Under such circumstances, the placenta forceps are no less valuable, than the obstetrical instrument in a case of vexatious dystocial labor. The instrument represented by Fig. 105 is better adapted to the extraction of the placenta, from the circumstance of its greater curve, by which it is more readily accommodated to the axes of the pelvis and uterus. Its application is attended with no difficulty, and it is capable of accomplishing more in a few minutes than could be achieved by the unassisted action of the uterus in many hours.

The Vectis. The vectis or lever, Figs. 107–108, it is thought is co-existent with the forceps, having been invented, it is believed from the most direct evidence, by the Chambelains, and with the latter instrument sold by one of the family to the three speculating Hollanders, whose names have been already mentioned. The terms *vectis* and *lever* are both objected to by Ramsbotham; the first as being suggestive of a great amount of strength necessary for its use; and the second, if used as a lever of the first kind, which the name would indicate, injury to the soft structures of the woman can scarcely be avoided by constituting them a fulcrum; he prefers the word *extractor* as given by Dease, or *tractor* as proposed by Burnes, Brundell and others, as they will lead to safer use of the instrument. The best specimen should be about 12 inches in length, 7 of which should be included in the blade and 5 in the handle and shank; the greatest curve should be near the point where it should be the widest, and about $1\frac{7}{8}$ inches across; the fenestra should be about two inches long and $1\frac{1}{8}$ inches wide in its centre, and inclined to an oval; it should weigh about seven ounces.

It was formerly used much more than at the present time. Its use is indicated where the short forceps are usually employed, and it has to a great extent been supplanted by the latter instrument. It is very seldom relied upon at present as an extractor, but is occasionally used for shifting the position of the head when it is low down in the pelvis, where the hand is incompetent to do it. According to Cazeaux, the lever might prove very serviceable in some of the posterior presentations of the face when too far engaged to admit of turning. When it is used for flexing the head and depressing the occiput, it is passed like a blade of the forceps directly upon the vertex, and as much as possible on the occiput; then by the hand that is al-

FIG. 107. FIG. 108.



SINGLE VECTIS. DOUBLE VECTIS.

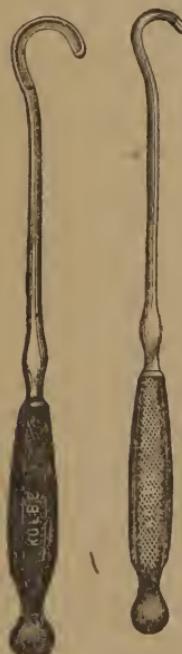
ready in the vagina and that has guided the instrument, let it be grasped near the middle and act as a fulcrum, whilst the other hand having hold of the handle draws it in a direction opposite to the one the head is to take; thus making the instrument act as a lever of the first kind; by operating in this manner the attempt is made to convert the face presentation into one of the vertex.

The mode of introduction is similar to that practiced in applying the first blade of the forceps; after it is introduced the next endeavor is to slide it over the part of the head to be operated upon the occiput when its flexion is designed, and upon one of the parietal regions when its lateral position is to be corrected.

After all that can be said of the instrument, its use and mode of application, it is of but little value at best. As an extractor it is far inferior to the forceps. And as a lever, to correct faulty positions of the head, where the hand is ineffectual, it is in nowise superior to one branch of the forceps which is often used in its stead.

The Blunt Hook. Hooks were among the most ancient means employed to overcome the difficulties attendant upon parturition. They had their sharp and blunt hooks. The former were among

FIG. 109. FIG. 110.



DIFFERENT SIZED
BLUNT HOOKS.

their destructive implements for extracting the fetus, which formed much the largest class of obstetrical instruments prior to the promulgation of the inventions of the Chamberlains. The latter, constituted one of the few pacific instrumental means of averting the dangers of child-bearing, that was in vogue in those days of the primitive state of our art. The instrument is about twelve inches long, with a blunt hook at one end, and wooden handle at the other. The blunt hook (Figs. 109, 110,) is sometimes used in embryotomy, in the place of the crotchet; where the head is softened and the bones loosened and separated by putrefaction, it may be used with greater safety, than the sharp hook, upon the application of traction, when made fast in the foramen magnum or behind the orbit.

In breech presentations, the blunt hook is brought into most frequent requisition, where the breech has passed the superior strait, and occupies the cavity, and where, from an inability of the uterus to propel it further, or from a contraction of the inferior strait, it is unable to advance; much service is derived from engaging the blunt hook in the groin, and making traction in the proper direction, at the same time soliciting the voluntary coöperation of the woman, especially

if the uterus be acting. The anterior groin, or the one behind or under the arch of the pubis, being nearer the external orifice is more accessible, and is the one to which the hook should be applied. The traction should be downwards and forwards, in direction with the axis of the outlet.

Where the head has been expelled, and the advance of the shoulders, either from their magnitude, or from an atonic state of the uterus, they are unable to advance further, the blunt hook applied to the axilla, most accessible, may render valuable service in effecting their disengagement.

In view of the blunt hook termination of the handles of the long forceps, a separate instrument is unnecessary.

The Fillet. Rhazes, who wrote about the end of the ninth century, describes the fillet under the name of *lāqueus*. It was formerly employed as a means of extracting the head in difficult labors. The contrivance originally consisted of a strip of strong cloth, silk, or leather, made into a noose or slip-knot, which binds the tighter the more it is drawn; sometimes the edges were sown together, making of it a hollow tube, open at both ends, so as to admit of the passage of a whalebone, cane, or wire, throughout its whole length to facilitate its application to the head, in whatever way was most readily accomplished, after which the cane was withdrawn, and extraction attempted by main force. Since the invention of the forceps, this contrivance has been discarded in head presentations, it being far more difficult in its application and hazardous in its use than the Chamberlain instrument.

The fillet, as used at present, consists of a piece of strong tape about $\frac{5}{8}$ of an inch wide, and $\frac{3}{4}$ of a yard long, and is seldom employed, except in cases of turning, where one foot only is found and brought down, which is secured by the fillet, and prevented from returning, while search is being made for the second one.

CHAPTER IV.

PERNICIOUS INSTRUMENTAL EMBRYULCIA.

SECTION I.—CEPHALOTOMY OR CRANIOTOMY.

Cephalotomy, or Craniotomy. Cephalotomy, from *κεφαλή*, *kephale*, "the head," and *τεμνεῖν*, *temnien*, "to cut," to cut the head; or craniotomy, from *κρανον*, *kranon*, the head or skull, and

FIG. 111.



FIG. 112.

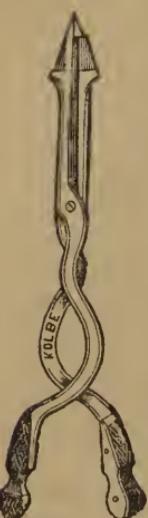


FIG. 113.



τεμνειν, *temnien*, "to cut," to cut the head or skull. Both being of the same signification, it consists of opening the head and evacuating the brain. It is among the most ancient of the obstetrical operations; for from the time of Hippocrates, down to the last century, it constituted the only means of artificially delivering the child in head presentations. Hence prior to the invention of the forceps and vectis, obstetrical instruments consisted almost entirely of knives or lancets, for piercing the foetal head, and blunt or sharp hooks, for extracting or dismembering the child.

Thus Hippocrates, Celsus, Albucasis, and others, have described a variety of such instruments, and given full directions for their use. (*Rigby*.)

The instruments required for this operation are of two classes: First, those for perforating; secondly, those for extracting. Of the first, we shall describe but three specimens, viz.: the perforator, Smellie's scissor, and the cephalotome.

For extracting the head, after it has been mutilated, a variety of instruments have been employed from time to time, the principal ones in use at the present day are the crotchet or sharp hook, the blunt hook, the common forceps, craniotomy forceps, cephalotome forceps, and osteotomist.

First, the *Perforator*, called Denman's perforator, (Fig. 111,) but which was invented by Levret. It is about twelve inches in length, provided with handles that occupy two-thirds of its entire length, and terminate in rings, like those of a pair of scissors; the other extremity terminates in a triangular point, formed by the two blades coming together, with cutting edges on the outside. The point is about one and half inches long from the base, at which there are shoulders or stops, to prevent its entering the head too far. The base of the triangular point is about one inch wide. This is the part that is designed to enter the head, when the handles are to be separated, which separates the two parts, forming the point, causing the incision to be enlarged.

Smellie's Scissors, (Fig. 113,) do not differ materially, in shape nor construction, from the perforator,

further than they are provided with cutting edges upon the inside, as well as the out, which overlap each other like those of a pair of scissors. The instrument is designed for the same use, and to act in the same way as the perforator, to which it is superior on account of its inner edges.

The Cephalotome, (Fig. 114). M. Hippolyte Blot has recently had this perforating instrument constructed, and it is believed that it is destined to supersede Smellie's scissors, as it possesses all the advantages of the latter, without its inconveniences. Its point is of a quadrangular form. One of its branches only is movable, and is worked by a spring attached to it, with one hand of the operator, while the other is at liberty to guide the instrument, and protect the soft structures of the woman against the effects of any mishap that may possibly occur. When closed it presents no cutting edge, hence the danger of wounding the fingers that guide it, or the vagina or uterus, in applying or withdrawing it, is obviated. Both branches are supplied with wooden handles. The principal advantages of this instrument may be summed up as follows :

1. Great solidity and simplicity.
2. Introduction and withdrawal entirely safe, rendering it capable of being used by the least experienced operator.
3. Capability of action by *pressure*, and that with a *single hand*, the other remaining at liberty to guide the instrument, keep it in its place, and know what becomes of it during the operation.
4. Power of perforating the bones with the least effort, and consequently with the least chance of slipping.
5. It is easily dismounted and cleansed.
6. Finally, simplicity of structure rendering it a cheaper instrument than Smellie's scissors, provided with their sheath. (*Cazeaux*.)

Secondly, *Instruments for extracting the head*. Crotchet, (Figs. 115, 116, 117). This instrument is about twelve inches long, is furnished with a wooden handle at one extremity, and a beak-shaped hook at the other. The shaft is slightly curved from the handle to the hook. It is recommended that the hook should be but moderately sharp. This is rather an indefinite term; it must be sharp enough to take hold of the structures to which it is designed to be applied, or it will prove useless; and if it is too sharp, it will be liable to cut through those structures, or tear them out, while strong traction is being made; in either case the maternal

FIG. 114.



CEPHALOTOME.

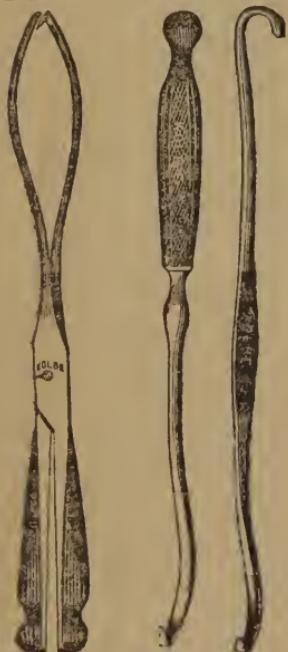
organs are in danger of being wounded. Instances have occurred, where the internal iliac artery has been wounded, and death from hemorrhage has resulted from this accident. In order to prevent injuries from this cause, Professor Davis had constructed a guarded crotchet, which was intended to protect the parts thus exposed during the extraction of the head; but from all we can gather concerning this improvement is, that it is far inferior to that made, some years ago, in this city, by Mr. John Rorer, who was in his day considered the prince of surgical instrument makers in this country.

FIG. 115. FIG. 116. FIG. 117. It consisted of two branches, provided with grooves or pivot and notch for locking, similar to those in the forceps. One is the ordinary crotchet, with the addition of the groove or pivot, the other is a plain piece of metal, nearly as long as its fellow, and having the same curve and a groove or notch. They both have wooden handles. The crotchet branch is first introduced into the cranium, through the perforation, and made fast, when the other branch is placed on the outside of the head, and when the instrument locks, the point of the second branch comes exactly over the sharp point of the crotchet, with which it comes in direct contact, immediately upon the hook cutting or tearing through the structures of the head, forming for it a complete cover, by which it is rendered entirely harmless. There is no other kind of crotchet as convenient and safe as this.

RORER'S UNGUARDED CROTCHET GUARDED CROTCHET AND BLUNT CROTCHET. *The Blunt Hook*, two or three sizes of which it is recommended to have at hand; and the common forceps have already been described and require no further notice here.

It is generally recommended in using the common crotchet after the hook has been made fast within the cranium to introduce a finger opposite to its point on the outside, and keep it there during the continuance of extractive effort, so that in case it should penetrate the scalp, it may come in contact therewith instead of the woman's structures. This, however, is a very uncertain means of protection and should never be relied upon.

The Craniotomy Forceps. (Fig. 118.) This instrument consists of two branches designed to be introduced separately, and locked by means of the grooves. Its length is about 12 inches; the handles are of wood, screwed upon iron plates, like those of the short forceps, and are provided with a groove or neck at their low end, for a ligature



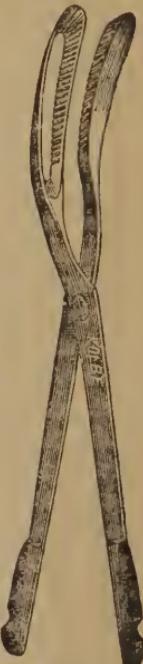
by which they are to be tied together when in use. The shanks and blades are slightly curved from the joint to the points of the latter; the blades constitute about one fourth of the entire length of the branches, the right one which is designed to enter the cranium, is provided with a number of teeth, and the left which goes upon the outside is furnished with indentations for the reception of the teeth. Thus by passing one blade into the head through the perforation and placing the other upon the outside, the bones of the skull and scalp are brought between them, upon which the blades being closed, and the handle ties fast together, a very firm hold is secured, and the teeth by perforating the structures, render the act of slipping impossible. Where the bones are strong a great amount of traction can be applied to the head and its disengagement made certain. But if the structures of the head are weak or softened by putrefaction, they cannot bear the amount of force the instrument is capable of exerting, but are liable to laceration. Under such circumstances the crotchet is the preferable instrument.

The Cephalotribe, or Embryotomy Forceps. (Fig. 119.) This is a very powerful instrument, designed to compress the head and crush the base of the skull, so as to enable it to pass through a very contracted space.

It is composed of two long branches, the blades of which are not fenestrated and are much less curved than those of the ordinary forceps; so, then, when closed, they can pass through a diameter not exceeding two inches; their joint is near the middle and a screw worked by a powerful lever passes through the ends of the handles by means of which the blades can be tightened at pleasure.

This instrument, invented by M. A. Baudelocque, nephew to the distinguished author, proved to be defective in two important particulars. 1. It was devoid of the second, or Smellie and Levret curve, and 2, the blades approached too near a plane to fully embrace the head, so that they were apt to slip when traction was applied. These defects have been corrected by Cazeaux, who instituted the needed second curve, and by widening the tablature at the joint, threw the blades farther apart at that point, which causes them to approximate proportionately at their extremities; thus without increasing their curves laterly, they are made to grasp the head in a manner that renders slipping almost impossible, let what amount of tractive force be applied that may, because the smallest space between the blades is at their extreme ends. The entire or greatest part of the bulk of the head being between the blades, its base must yield to their crushing power, and the contents squeezed out through the perforation and

FIG. 118.

CRANIOTOMY
FORCEPS.

the head reduced in size so as to enable it to pass through very small diameters.

The Osteotomist: (Fig. 120.) This is a very powerful instrument employed by Professor Davis to break up the bones at the base of the skull, and thus diminish the size of the head at that part, so as to enable it to pass in cases of extreme deformity of the pelvis. It is inferior to the cephalotribe for this purpose, and has in a great measure been superseded by it.

FIG. 119.



THE CEPHALOTRIBE OR EMBRYOTOMY FORCEPS,
PARTIALLY FENESTRATED BY MR.
KOLBE.

FIG. 120.



THE
OSTEOTOMIST.

The operator should be provided with a pair or two of large surgeon's forceps, with strong jaws and serrated, for the purpose of removing pieces of skull, as they may be accidentally broken off during the operation.

When shall Cephalotomy be resorted to? This question has been the subject of much discussion among accoucheurs for a long time. It has been held that it should not be attempted upon a live foetus unless it be so much enfeebled by the protracted labor or otherwise, as to render the probability of its living more than a few minutes or hours, extremely slender. By some it is advocated that the life of the mother should be put in jeopardy by submitting to the Cæsarean section, to save that of the foetus; and where reason and common sense have failed to sustain this monstrous proposition, theology has been put under contribution to afford its support. While the unborn foetus from its very helplessness, appeals eloquently to our sympathies for protection, the mother has vastly more momentous claims upon our consideration, which should never fail to determine our course of action when the latter is to be put in imminent danger to save the former from being sacrificed.

Without reference to the life of the foetus then, where the diameters of the pelvis are below 3 inches in the conjugate, and 4 in the transverse (the least space through which a living child of ordinary size can pass), this operation, bloody, horrible and soul-sickening as it is, must be resorted to in order to rescue the mother from impending and certain destruction. We are aware that some authors give something less than the above as the minimum space through which a living child may escape; but if we err, we prefer erring on the

side of safety, than to be trusting to less dimensions until the woman is ready to expire from exhaustion, and then in this half dead condition, require her to submit to the extraction of the foetus by cephalotomy. Our apprehensions are very strong that much graver errors have been committed by destroying the foetus when the dimensions of the pelvis have been above the measurements given than where they were below them; for numerous instances are recorded where women have borne living children after having had previous ones extracted by means of the perforator and crotchet, showing that such operations were wholly unnecessary, and that the children thus destroyed might have been saved by the exercise of a little more patience, or having recourse to more pacific measures.

Mode of Operating. By studying the two classes of instruments used in cephalotomy, as above described, it will be apparent that there are two stages of the operation, one to which each class is adapted. These are: 1, The stage of perforation; 2, The stage of extraction.

1. *The Stage of Perforation.* The position of the woman for the operation may be determined by the position of the foetus. If the deformity or obstruction making it necessary, exist at the superior strait, rendering the descent of the head impossible, the most convenient and favorable posture will be that directed for turning and the application of the long forceps; but if the difficulty be at the outlet, with the head occupying the cavity, the usual position for delivery will afford ample facilities for prosecuting the work.

In case of the selection of either position, the bladder and rectum being evacuated, the perforation of the head must commence by selecting the proper instrument. If it be Denman's perforator or Smellie's scissors with its sharp outer edges, the ends of two fingers of the left hand must be placed against the most pendent part of the head. Then, with the right hand, the instrument must be passed up, with its point in the groove between these two fingers, until it reaches the point of the head to be acted upon, when the two fingers are to be separated, so as to separate the labia or walls of the vagina to prevent them from coming in contact with and being wounded by the sharp edges of the instrument. Pressure is then to be made firmly against the head, and a rapid rotatory or boring motion instituted, and continued until the point of the instrument penetrates the skull, which is known by a diminution of the resistance it affords to the instrument. After it is known that the point has entered the cranium, the instrument must be pushed up until its further advance is arrested by the shoulders or stops at the base of the triangular point. The cutting part of the instrument being now concealed in the cavity of the skull, and the present danger of wounding the woman's structures annulled, the left hand is at liberty to assist the right in separating the handles, which must be done to the extent of three inches, which will cause

an increase in the length of the incision in the skull of about $1\frac{1}{2}$ inches. The handles are now to be closed, and without withdrawing the instrument, it must be turned half round so as to bring the cutting edges at right angles with the incision just made, when the handles are to be again separated and a crucial opening made. The instrument must now be thrust into the cavity, far above the shoulders or stops, to the base of the brain, when the structures must be thoroughly cut and broken up, the membranous septa, as the tentorium and falx cerebri, wholly destroyed, and the brain reduced to a pulp. For this purpose Smellie's scissors or the cephalotome is preferable to the perforator of Denman, on account of their internal cutting edges.

As organic life is known to depend upon the integrity of the structures at the base of the brain, it is of the utmost importance that they should be thoroughly and effectually destroyed, and the blood-vessels cut or lacerated, so that hemorrhage may complete the work that may possibly be left unfinished by a lack of the utter demolition of the nervous structures, viz.: the extinguishment of the life of the foetus. To this end, our main exertions should be directed, at this stage of the operation; and, to effect it, the instrument must be moved, with a rapid, stirring motion, in every direction.

To pursue the life of the unborn innocent with such determined persistence, may, to the sensitive and feeling mind, appear fiendish and cruel; but, really, it is an act of the greatest kindness and humanity, both to it and the unfortunate mother; for what could be more shocking to her feelings, or revolting to her maternal sensibilities, than to hear the plaintive cries of her infant, born into the world with its head mutilated, and its brain oozing from the fatal wound, only to survive a short time, and then expire in untold agony? Or, what could be more inhuman to it, than to allow it to breathe the vital air, only to prolong its existence and augment its sufferings?

The operation should never be commenced without duly weighing the responsibilities attached to it; but, if once undertaken, the work of death should be thorough and complete, before the hand of destruction be stayed.

This stage of the operation is not unattended with difficulties, especially when the head is not engaged in the superior strait, but remains mobile in the uterine cavity. Sometimes it seems almost impossible to penetrate the skull, with all the skill, tact and perseverance the accoucheur may possess, or assistance he may derive from those in attendance, or whom he may have summoned to his aid. Neither intelligence nor dexterity can perform a mechanical feat contrary to the laws of mechanics. To attempt to make pressure upon the foetal head sufficient to perforate the skull, while it remains unfixed above the superior strait, would be as futile as

to attempt to sever a round piece of wood, floating in water, by the gradual application of force. Fixedness is the essential condition for success in either case. But to secure this condition, in regard to the foetal head, where the contraction is so great as not to allow of any part of it engaging in the strait, is a matter not very easily accomplished. It is true, we are told, to make external downward pressure, with both hands upon the abdominal tumor, or require it to be done by an assistant—and this is all we can do, to render the head sufficiently stable to be acted upon efficiently—but it requires more effort and perseverance than might be imagined, to accomplish it. Sometimes, several hours of the most anxious and laborious exertion elapse, before the work of perforation can be consummated.

The following case, illustrative of the difficulties arising from this cause, and which was reported by our sister-in-law, Hannah E. Longshore, M.D., reflects great credit upon her, and the scientific ladies who assisted her, as it proves that women, when properly qualified by education and experience, are as capable of meeting emergencies and surmounting difficulties, as our own sex, notwithstanding our savans have, with much gallantry, denied them the credit of possessing sufficient intelligence to compete with them for professional honors and emoluments:

"Mrs. B—, aged twenty-six years, primipara; labor commenced December 7th. On examination, found the antero-posterior diameter of the superior strait contracted to $2\frac{1}{2}$ inches, by the anterior projection of the promontory of the sacrum; the os uteri dilated, and the posterior fontanel presenting to the left; head large, and unable to enter the superior strait. 8th. Pains regular and strong, without any advancement. 9th. Pains regular; no advancement. Patient nervous, excitable and anxious. Explained to her the improbability of nature, unaided, being able to effect delivery. Patient willing to submit to whatever was thought best in the case.

"Craniotomy appeared to promise the only relief. Called on my friends, Harriet Judd Sartain, M.D., E. Calvin, M.D., and Jane V. Myers, M.D., to assist me. They concurring, the patient was put under the influence of chloroform, and I proceeded to perforate the skull. We found much difficulty in accomplishing this, as the head was so movable, the instrument glided off.

"After several hours of patient toil, we at last succeeded in penetrating the skull. We removed, piece by piece, fractured portions of the cranial bones; broke through the orbital plate; forced the blunt hook under the frontal ridge; drew the loose scalp closely over the remaining portions of the skull, and, by a great effort, succeeded in drawing the foetus through the superior strait, the ribs breaking as the body passed.

"Uterine contractions came on; removed the placenta; the patient did well.

"The chief points of interest in this case, are extreme difficulty in perforating the head, which cannot well be avoided, when it is not fixed in the superior strait, the great projection of the promontory of the sacrum, shortening the antero-posterior diameter of the superior strait to $2\frac{1}{2}$ inches, and the inability of the head to engage in it."

2. *The Stage of Extraction.* If the woman be strong, and the uterus acting vigorously, and there be no necessity for the immediate extraction of the foetus, after the perforation, and the diminution of the head, by the partial evacuation of brain, the labor may be trusted for a time, to the efforts of the organism, and if they be found sufficient, no further interference will be necessary. It is recommended by some to scoop out the cerebral mass, with a spoon or scoop; others to throw into the head a stream of water, by means of syringe, to wash it out. But either of the expedients is unnecessary, as the matter will be squeezed out as the head enters the strait, either by the spontaneous efforts of the uterus, or by means of the extractive agencies, employed by the accoucheur.

The free discharge of the brain matter, after perforation, whether the labor be progressing spontaneously or artificially, is evidence that the head is engaging in the contracted strait, and that it is progressing favorably.

If it be found, after waiting a reasonable time, which must be determined by the condition of the patient, that the head is making no advancement, that she is struggling in vain, and that the uterus is acting to no purpose, there should be no hesitation in taking in hand such extractive instrument as appears to be best adapted to the case, or that the accoucheur may be in possession at the time, and applying it as has been already indicated. Let the instrument be whichever one it may, caution is always necessary, during the application of powerful contraction, that it does not slip, and where either variety of forceps is employed care must be taken that the cervix uteri is not implicated between the blades and head, but that they are clearly within the uterus, and that no part of the uterine structure is in danger of being pinched or bruised by such implication, or that there exists a possibility of the uterus being displaced, or extracted with the head, by having them both enclosed together between the blades of the instrument. There are upon record instances of horrid mutilations of women, resulting from carelessness or ignorance in the employment of extractive instruments, where their use has been indicated, as well as where it has not.

Without due caution, injury to the patient may result from the use of the perforator, as well as the extractor, by the structures of

the labia or vagina becoming involved in the joint of the instrument, and being severely pinched, or painfully contused.

The instrument having been made secure, and the foregoing precautions observed, the necessary traction should be made, in harmony with the contractions of the uterus, and the solicited voluntary efforts of the patient. Where the obstruction exists at the superior strait, the traction must be made in direction of the axis of that strait, that is in a line from the umbilicus to the coccyx; for this purpose the instrument must be pressed backwards as far as the perineum will permit, during the traction. Where the uterus is inactive, and the patient in a condition not to respond to solicitations for voluntary assistance, the traction must be intermittent with moments of respite, in imitation of the natural action of the uterus.

When the contraction is at the inferior strait, traction must be made outwards and downwards in direction of its axis.

All jerking or irregular motion must be carefully avoided during the extractive effort, as such movements would facilitate a fracturing of the bones, and complicate the existing difficulty, which accident, it is desirable should not occur.

Where the contraction of the pelvis is great, much time and effort are often required to effect the extraction of the foetus, the bones frequently break several times during an operation, and have to be removed piece by piece; this should be done carefully, lest the structures be wounded by their rough edges.

It is recommended by some to perforate the head at one of the fontanelles; this however cannot be done without incurring the risk of wounding the os uteri; the most pendent part, or that furthest from the ring of the os, should therefore be selected.

The head after being extracted, should be enveloped in a napkin, and if any difficulty should occur with the shoulders, it may be overcome by applying the blunt hook in the axilla, and making contraction in direction of the axis of the inferior strait.

SECTION II.—SYMPHYSEOTOMY.

Symphyseotomy, from *συμφύσις*, *syphysis*, and *τεμνω*, *temno*, "to cut." "The operation or section of the symphysis pubes." This operation, which consists of dividing the pubes at the symphysis, and separating the bones, with a view of increasing the antero-posterior diameter of the superior strait, was formerly employed, to some extent, as a means of overcoming the difficulties arising from deformed pelvises. A very brief historical notice of the operation is given in the introduction of this work, which will suffice to give the student some idea of its rise, progress and fall.

Dr. Dewees, in introducing the operation to his readers, observes that: "I should not have enumerated this operation as one of the

resources of the art, but to have it in my power to declare it not to be one." That it has been resorted to several times with success, there is abundance of proof; but that the same labors might not have terminated with equal success, through the intervention of other and less hazardous resources, is not quite so evident. When it is borne in mind that a separation, to the extent of two inches, at the symphysis pubes, is required to gain six lines in the antero-posterior diameter of the superior strait, it is almost conclusive that with a due exercise of skill and dexterity, and a proper reliance on the powers of the uterus, the forceps would have been sufficient to overcome any obstacle that could be obviated by increasing the conjugate diameter only six lines.

This operation was first suggested by M. Sigault, as a substitute for the Cæsarean section, and for some time after its introduction in 1777, where it was first performed with success by Sigault himself, there raged a perfect mania in its favor, and it was wantonly resorted to, it is feared, on many trivial occasions, when the obstruction to the passage of the head scarcely required the interference of art at all. So far from its being used as a substitute for the Cæsarean section, it was employed more frequently in four or five years, than the former was in half a century.

The advocates of the operation, during the prevalence of the mania, excited by its alleged success, did not hesitate to aver that it was a trifling matter of itself, and that everything depended upon the after treatment, so far as the completeness of the recovery or safety of the patient was concerned. Dr. Manchini, Professor of Anatomy at Naples, in 1824, performed the pubic section in two instances; and, notwithstanding the assumed triviality of thefeat, it is recorded that, in one case, no reunion of the bones took place, and the woman was made a cripple for life, the power of walking having never been recovered, was performed in a straddling manner.

There is but little doubt that in most, if not all the cases where the functions of the pelvis were not destroyed or greatly impaired by the operation, there was but very little deformity, and that a separation of the bones did not take place to any very great extent.

The manner of proceeding with the operation, when it was in vogue, was to divide the symphysis, and then place the woman in a warm bath, and leave the further separation of the bones and dilatation of the parts to the efforts of the organism.

In a great number of experiments performed by Baudelocque, on dead subjects, it was found that a separation was not obtained in any one instance without tearing the sacro-iliac symphyses, and that tearing, which began sooner or later, was more or less considerable. In one experiment, on a pelvis of four inches and seven lines in the small diameter, and four inches and three-quarters in the

other direction, the ossa pubes could not be separated twenty-one lines, without opening the sacro-iliac symphyses so far as to admit the end of the finger, and, in the sequel, so far as to receive the end of the thumb, and, at the same time, tearing the periosteum from the sacro-iliac symphyses, and rending it an inch before them.

A bit of old leather may be rendered distensible, and be made to stretch beyond its ordinary dimensions, by being soaked in warm water, but it is not quite so certain that a warm bath will produce a like effect on the living tissues; if not, the many experiments made by Baudelocque, on dead subjects, as well as the unfortunate results of the operation upon the living, stand out in condemnation of the practice, notwithstanding children have been born alive under its action, when proof is wanting that such an event would not have occurred, had it not been resorted to.

In viewing the Sigaultian operation theoretically, and noting its results in many recorded cases, we find in it nothing to commend, but much to condemn.

The only means afforded, by the present resources of our art, of relieving the woman, in cases of extreme distortion of the pelvis, are cephalotomy and the Cæsarean section. While the first purpose is the inevitable destruction of the foetus, the latter, though terrible to contemplate, is capable of affording safety to mother and child, though it frequently results disastrously to both.

SECTION III.—HYSTEROTOMY.

Hysterotomy, from *υστέρα* (*ustera*), "the uterus," and *τεμνω*, (*temno*) "to cut." The operation consists in dividing the abdominal and uterine walls and extracting the foetus through this artificial opening. It is more frequently spoken of as the *Cæsarean operation*.

It is of great antiquity, though the precise time at which it was first had recourse to is not known. That it had its origin in the far back centuries of the past, allegorically at least, may be inferred from its being identified with the traditions of Greek and Roman mythology. In the fictions of both, Bacchus was the son of Jupiter and Semele, a daughter of Cadmus. In answer to her request, Jupiter appeared to her in his full majesty and divinity, the fiery splendor of which caused her death, it is said, in the seventh month of her pregnancy. Jupiter saved alive the infant Bacchus, and carried him in his own thigh until the proper time of his birth. The idea of extracting a living foetus from the uterus of its dead mother may have owed its conception to this traditional myth.

Æsculapius, the fabled son of Apollo and the nymph Coronis, is said to have been brought into the world in the same manner, by the hands of his father, after she was placed on the funeral pyre destined to consume her.

We have no authentic record of a case of successful hysterotomy earlier than that of Georgius, who became a distinguished philosopher and orator, which occurred at Leontin, in Sicily, 508 B. C. This case is spoken of by Valerius Maximus as one of posthumous birth.

A law made by Numa Pompilius, the second king of Rome, interdicting the interment of a woman far advanced in pregnancy, without first being operated upon, according to Pliny, saved Scipio Africanus, the conqueror of Hanibal; and Manilius, another celebrated Roman general, about the year 300 B. C. They both having been extracted from their mothers after their death. This law is still strictly observed by the Roman Catholic Church.

The first medical authority that recognizes the operation is the *Chirurgia Guidonis de Cauliaco*, published about the middle of the fourteenth century; but the practice was confined from the earliest records of hysterotomy down to this period, to *post-mortem* cases. The Jewish records, however, refer to the operation on living women at a much earlier period. Rigby gives the following quotation from the *Mischnejoth*, which is alleged to be the oldest book of this people, and supposed to have been published about 140 years before the Christian era, or according to some, even antecedently to this period: "In the case of twins, neither the first child which shall be brought in the world by the cut in the abdomen, nor the second, can receive the right of primogeniture, either as regards the office of priest or succession to property." In a publication called the *Nidda*, an appendix to the *Talmud*, the next oldest book of this people, is the following, confirmatory of the above:

"It is not necessary for women to observe the days of purification after the removal of the child through the parietes of the abdomen." (Rigby). Forty days are the days of purification, during which the woman must live apart from her husband after a natural birth.

If there had been no instances of the Cæsarean operation upon the living woman at this period of the world, which opinion seems to be favored by Cazeaux, there were certainly entertained notions of its feasibility, and the probability of its adoption, as it was evidently provided for in their civil and ecclesiastical codes.

There is a semi-authentic account by Goulin, of a lady at Caron, who submitted to the operation in 1424, and who with her child survived it.

It is alleged by Velpeau that the ancient Greek and Latin physicians make no mention of it whatever.

According to Rigby, the first authentic operation upon a living woman in later times, was the celebrated one by Jacob Nufer, upon his own wife in 1500. There are some unfortunate discrepancies in the history of this case which must impair its authenticity; it is purported to have been recorded by Gaspard Bauhin, who was born

at Lyons in 1561. He was a man of great learning and filled various posts of dignity and importance in the institutions of science and philosophy of his day, among which was professor of Greek, then of Anatomy and Botany, then of Medicine at Brazil, with other distinguished honors which he retained till his death, 1624. These discrepancies we would rather attribute to his copyist than to himself.

Velpeau makes Bauhin to say that Nufer, a spayer of cattle, operated upon a person called Alipaschin, of Siegershensen in Germany.

Ramsbotham quotes him thus: "The operation was performed at Siegenhausen, by a cattle-gelder named Alespachen, on his own wife, about the year 1500;" and refers to page 162, Bauhine's translation. Ramsbotham and Velpeau agree in saying the woman survived the operation and bore several children afterwards naturally.

There might have been a woman operated upon about that time, who survived the operation, and had children afterwards in the natural way, and there might not. We do not call this an authentic case by any means.

A case reported by Nicolas de Talcon, alleged to have occurred in 1491, is said to be authentic; but its reliability, like the former one, may be questionable for want of corroboration.

F. Rouset published a work in 1581, in Paris, entitled *υστεροπομφαία, usterotomia*, "hysterotomy," which was translated from the French into Latin by Gaspard Bauhin in 1601. This work recites several cases (seven cases in particular,) where the operation proved successful on living women; some of which appear so marvelous, as to call forth the apparent incredulity of Velpeau. Rouset was the first to advocate the performance of the operation on the living subject.

Whether either of the isolated cases mentioned, or any of the collection published by Rouset, were successful or not, we have no means of ascertaining positively; but from all that can be gathered in regard to it, we are constrained to believe that the operation began to be practiced on living women in the early part of the sixteenth century, and that it must have proved successful to an extent sufficient to have encouraged its continuance, or it would have been abandoned as a fruitless attempt to substitute art for nature, in the performance of her grandest and proudest work. But we know such was not the case, for we have this means of relief to both mother and child resorted to in our own time, sufficiently often and with a degree of success, that fully justifies its being retained as a valuable and indispensable agency in rescuing our fellow beings from the jaws of death.

The effect of Rouset's publication was to so far popularize the operation, that it was employed often without the least indication

of its necessity, as several instances are recorded of children being born subsequently to its performance, by the natural passages. The failures of success at the hands of Paré, Guillimeau, Marchant, Mauriceau and other eminent surgeons, soon produced a counter effect, which resulted in checking to a very great extent, the employment of the Cæsarean operation in dystocial labors. It was the theme of fierce combat throughout the seventeenth century, and the unsettled state of professional opinion caused by the discussion, continued during the greater part of the eighteenth; and even at the present day, the essayist indulges in defining the indications for its performance rather than settling the question as to its general utility or destructiveness.

The Cæsarean operation is said to derive its name from the supposed circumstance that Julius Cæsar was born by this means. This opinion, derived from a passage in Pliny, was enunciated by Guy de Chauliac who appears to be first to describe it. The name was given to it by Rousset. But the story of Cæsar's ingress into the world by this artificial opening, has been shown to be fabulous by the researches of Bayle, who remarks that Aurelia, the mother of Cæsar, was still living when he went to Britain. And at thirty years of age, he speaks of his mother Aurelia as being still alive. As the operation was performed upon dead women only, at this period, the fact of her being alive at thirty years after its alleged performance on her, invests the entire tale in a mantle of discredit, and stamps it as a first-class fiction. Professor Nagèle's explanation of the etymology of the name, is, that one of the Julian family at Rome, had been delivered *excesso matricis utero*, (*Cæso*, rendered into English, meaning, "*a child cut, or ripped out of its mother's womb*,") and had been named Cæsar, from *cæso*, so that the name was derived from the operation, and not the operation from the name. This has much more the air of plausibility, than the dominant opinion.

The results of the operation have been distinguished by different degrees of success, in different countries. In France, Germany, and the United States, they have not been remarkable for their fatality, considering the gravity of the process. While in England the results have been decidedly unfavorable.

Klein has collected on the continent, with the greatest care one hundred and sixteen well-authenticated cases, of which ninety terminated favorably, and Dr. Hall, in his *Defence of the Cæsarean Operation*, has reported one hundred and twelve cases, of which sixty-nine were successful. M. Simons has not only collected cases which were favorable, to the number of seventy or seventy-two, but which were performed on a few women, "some of them having submitted to it three or four times, others five or six, and even as far as seven times, which if they were true, would superabundantly prove that it is not essentially mortal."

Dr. Merrimen has collected the results of twenty-six cases of Cæsarean operations in England, of these only two mothers and eleven children survived; thus out of fifty-two lives only thirteen were saved. (*Baudelocque, translated by Heath.*)*

By the report of J. Burns and S. Cooper it appears that not a single well attested case of its successful performance has occurred in Great Britain, although the number of the operations amount to fifteen or twenty. (*Velpeau.*)

Under favorable circumstances, the operation is not necessarily so fatal a one as might be inferred from these reports, as it is now a well established and universally accredited fact, that women have submitted to its performance several times without any serious inconvenience resulting from it. One case mentioned by Rigby, was first operated on in January, 1826, then in her twenty-ninth year; the second time in January, 1830; the third in March, 1832; and the fourth on the 27th of June, 1836. It has been twice performed by Professor William Gibson, on Mrs. M. R_____, of Philadelphia; the first time with a daughter, and the second with a son; the first was named, Mary Cæsarean, and the second Cæsar Augustus. For several years the professor took great pride in exhibiting those children to his class, in the amphitheatre of the University of Pennsylvania, as trophies of his skill as an operator, and as living evidences of the triumph of American Surgery. The mother and both children lived for several years, and for all we know to the contrary may be living yet. Michaclis has performed it four times on the same woman in Germany, with perfect success.

Its almost universal fatality in Great Britain has led M. Tenon to declare to Dr. Garthshore that in his opinion the reason why it had so seldom succeeded in that country was because, there the operation is almost invariably deferred too long, for the patient is suffered to be almost in *articulo mortis*, before it is undertaken.†

While there is not the least doubt that the great mortality attending the operation in Great Britain is due to the cause just stated, still there is much cause to fear that the continental accouchers have been too hasty in deciding upon its necessity. They have been accustomed to place the relative value of life, between the woman and the foetus, at too low an estimate, and when either cephalotomy or hysterotomy was required, they have given preference to the latter, thus placing the life of the woman in great jeopardy to save the child. Notwithstanding, by operating much earlier in the labors before the patient had become exhausted, or the system excited to almost or quite an inflammatory condition, their success was far greater than with their British brethren. Their

* Rigby's System of Midwifery.

† Dewees's System of Midwifery.

most favorable reports show that the loss amounted to nearly twenty-three to one hundred. Now admitting all these one hundred children were saved, which is more than the most ardent devotee of the operation claims for it, we submit, was it not at too great a sacrifice of valuable adult life? We again submit, where is the wife, or the husband with proper feelings, be he physician or layman, that would consent that her life should be sacrificed to save that of less than four unborn foetuses, who, when delivered, must be subject to all the casualties and uncertainties incident to the life of infancy and childhood? Or where is the community that would tolerate such a sacrifice? Or where the law human or divine, requiring it? The decision should be left to the woman, as the person most intimately interested in the issue, after a fair and full explanation of all the dangers and probabilities connected with the operation, whether she would jeopard her life, to save that of her unborn foetus, or not. The accoucheur, in endeavoring to influence that decision, either from theological, mercenary, or other motives, deviates from his line of duty, and should be held responsible before the community and the law for his conduct.

It is held that cephalotomy often proves fatal to the woman, and that her safety is not much enhanced by preferring that to the Cæsarean section, which promises much for the foetus. Notwithstanding Baudelocque, the nephew, says that more than half the women die who have embryotomy performed; the operation is not *per se* a fatal one to the woman, and where it is followed by such a result, it is evident that its performance has been deferred too long, or the pelvis is too much contracted to admit of the passage of the foetus after the mutilation of its head, or that some other extraordinary cause of the fatality is present. There is no more reason that the death of the woman should necessarily follow cephalotomy performed at the proper time and upon the proper subject, than that it should necessarily result from the use of the forceps.

Hysterotomy has been substituted for cephalotomy by the French and German accoucheurs. Indeed in all Roman Catholic countries, distinguished for the cultivation of medical science, a like preference is given to the former even at the sixth or seventh month. The desire to have the child christened is held to be paramount to the safety of the mother. In Protestant England and free America, where perhaps this religious rite is undervalued, and the value of woman's life duly appreciated, the Cæsarean section is less frequently resorted to; though Dr. Dewes, the Baudelocque of America, takes strong grounds in favor of his Gallic and German contemporaries, and urges the propriety if not the necessity, of preferring the Cæsarean operation to cephalotomy, where the contraction of the pelvis renders either necessary.

When and under what circumstances should Hysterotomy be employed to insure the greatest amount of safety to both the Woman

and Fœtus? It appears to us that this is the only legitimate question that can be presented for consideration in contemplating a resort to this grave and important measure. Nothing but the most earnest and conscientious reasons should influence us in deciding upon a measure involving the probability of a sacrifice of human life. And nothing but the most urgent and inevitable necessity should prompt us to decide in favor of such a means.

We cannot acquiesce in the recommendation that hysterotomy should be employed when delivery can be effected by cephalotomy, but would rather regard it as the dernier resort to be embraced where no other means can be made available.

It has been stated elsewhere, upon the authority of Ramsbotham, that the lowest dimensions of the superior strait through which a medium-sized fœtus with the head diminished by cephalotomy can be extracted, is 1 and 3-8ths inches in the conjugate, and $3\frac{1}{2}$ inches in the lateral diameters; or $1\frac{1}{2}$ inches in the conjugate and 3 inches in the lateral. These with perhaps slight variations are the acknowledged minimum dimensions allowing of the exit of a mutilated fœtus. Where the measurements exceed these, the Cæsarean operation is not indicated. Where they are below them, the patient must be abandoned to her fate or submit to hysterotomy as the only means of relief. After the os uteri has become sufficiently dilated to allow of the free escape of the lochia, and the extent of the contraction of the pelvis fully ascertained, no time should be lost in vainly waiting for the powers of the organism to accomplish what they are incompetent to do; for by such a course the uterus will be becoming more and more exhausted from fruitless efforts to expel its contents, or the general system excited to a feverish condition, or perhaps local inflammation will have commenced, rendering the patient utterly unfit to undergo so serious and dangerous an operation.

A very interesting question arises in regard to operating upon a woman after death, with a view of saving the child. How long does the fœtus continue to live after life in the woman becomes extinct? This question involves, to a great extent, the propriety of operating at all, for if the fœtus has ceased to live, the mutilation of the woman's body would be useless. The length of time the fœtus may survive the death of the woman, varies from several hours to a few moments, though frequently it is *first* to expire. In the Princess of Schwartzenberg, who died at Paris, of a burn, the fœtus was found living the day following her demise. M. Gardian mentions the case of a woman who was not opened for forty-eight hours after death, in which the fœtus was found living. Several similar cases have been related by other authors, as Flajani, Vesslingius, etc. When a woman belonging to the Roman Catholic Church dies in labor, it is, we understand, the duty of the priest to have her opened immediately, with the view of saving the child,

or at least to afford it an opportunity of receiving the rites of the Church, while yet alive. We were once requested by an officiating clergyman of this denomination, to operate upon the body of one of his parishioners, who, as he informed us, had been dead fifteen minutes. By the time we arrived at the house, thirty minutes had elapsed; the body was opened immediately, but all traces of life in the foetus had become extinct. The labor had progressed so far that the head occupied the cavity of the pelvis, the child, which was a large one, with the secundines, were extracted, and the incision in the linea alba closed by a continued suture. We can perceive but one rule to be observed in regard to the performance of this operation after death, and that is: it should be done as soon as it is ascertained that life has become extinct. Notwithstanding those cases of marvelous longevity of the foetus, after the death of the woman, to which we have alluded, it very seldom occurs that it survives her death more than fifteen minutes at farthest; and when extracted, even within that time, disappointment is very apt to attend this effort to save it, though many well-authenticated instances are recorded, where complete success has rewarded the attempt, which afford sufficient encouragement to have it made, where it is evident the foetus is living at the time of the woman's death, and where not more than ten or fifteen minutes elapse before the operation is commenced.

It is enjoined that as much care and precision be observed, in operating upon a woman who has recently died, as though she were living, for her condition may be that of apparent death instead of real, from which recovery may be possible. Indeed, the Senate of Venice decreed severe penalties upon accoucheurs who disregarded this prudential direction. Several cases are recorded, of women supposed to be dead, who have recovered from their torpor, just as the Cæsarean operation was about to be performed upon them. Peu relates a case, where the operation was commenced, and the incision followed by a shudder, grinding the teeth, and a movement of the lips. Rigaudeau relates another, to which he was called, after the woman was supposed to have been dead two hours. Instead of subjecting her to hysterotomy, he proceeded to deliver the child by turning, which he accomplished. Though the child was apparently dead, it was resuscitated after two hours' exertion. After leaving instructions how to proceed he withdrew. In a few hours the woman recovered completely, and four years after came to Rigaudeau to inform him that she was not dead. Such instances should serve as admonitions against recklessness in operating, even upon bodies reputed to be dead.

Various Modes of Performing the Operation. Different modes have been proposed, by different operators, for performing hysterotomy. The ancients preferred the left side, and made their incisions straight, oblique or slightly curved, but always immediately

outside the rectus muscle. This was with a view of not wounding the bladder, of rendering cicatrization more easily effected, and of facilitating the escape of such discharges as must issue from the wound. These apparent advantages do not compensate for the risk of wounding, if not dividing, the epigastric artery, or some of its important branches, which it is always advisable to avoid, on account of the troublesome if not dangerous hemorrhage that must result. The retraction of the divided fibres of the oblique and transversalis muscles, would prevent the proper adjustment of the lips of the wound, in the lateral incision, and thus interfere with the proper healing of the cut; and the coaptation of the abdominal and uterine openings, during the operation, it would be very difficult to maintain.

Lauverjat recommended a transverse incision, about five inches in length, between the rectus muscle and spinal column, more or less below the level of the third false rib, according as the fundus of the uterus is more or less distant from the line of such level. By this means the fibres of the transverse muscles are rather parted than divided; the epigastric and lumbar arteries are avoided; the opening is made in the uterus at its fundus, the cavity is left a perfect channel for carrying off the discharges, by the vagina; the coaptations of the openings are easily maintained; no suture is required in the dressing, the mere position keeps the lips of the wound in apposition, and lastly extravasation into the abdomen is much less likely to occur. But notwithstanding the two favorable cases of *Lauverjat*, and the approval of *Sabatier* and *M. Gardian*, the advantages of this mode are over-stated. It is objected to: 1. Because the fibres of the external and internal oblique muscles are necessarily divided. 2. Because the least effort must force the viscera out. 3. The contraction of the uterus must rather hinder than promote the approximation of the edges of the inner incision made in the fundus of the organ, where the vessels are all the largest. While we admit we cannot see the force of the last objection, we consider the two first sufficiently valid to cause a degree of hesitation before adopting the mode.

Ritgen, with a view of avoiding the danger of wounding the peritoneum and the *body* of the uterus, proposed to divide the attachments of the broad muscles of the abdomen above the crest of the ileum, and detaching the peritoneum as far as the superior strait, and that the *cervix uteri* be divided to an extent sufficient to admit of the extraction of the foetus. This mode of operating is, so far as is known, but an untried project, not possessing sufficient merit to recommend its practical application in a single instance to a living woman.

M. Baudelocque, Jr., desiring to avoid the double wounding of the peritoneum, and also to preserve the continuity of structure of

the uterus, the dissolution of which he regards as almost essentially fatal, suggests making an incision in the left side commencing near the spine of the pubis and extending nearly parallel to Poupart's ligament beyond the anterior superior spinous process of the ileum. The left side is selected because of the inclination of the neck to that side, while the fundus and body inclines to the right. The peritoneum is now separated from its attachments in the iliac fossa down into the excavation, and detached from the upper part of the vagina in which a free opening is made, the finger is introduced through this opening into the os uteri, by which the latter is drawn towards the openings in the vagina and parietes, the fundus being at the same time pressed to the right side to facilitate the turning. After the os uteri is brought in apposition with these openings, the delivery is left to the contractions of the uterus, and is expected to be effected through the artificial aperture and the uterus left unwounded. If necessary the wound may be enlarged, and the delivery assisted by the hand or the forceps.

This operation was named by its author, elytrotomy, from $\varepsilon\lambda\nu\omega$, *eluo*, "to wrap up, fold in, cover, case," or $\varepsilon\lambda\nu\tau\rho\nu$, *elytron*, "a vagina or sheath" and $\tau\varepsilon\mu\omega$, *temyo*, "to cut." A cut or opened vagina. This idea, an acknowledged ingenious one, originated in dissection of the dead bodies in both the gravid and non-gravid state, but has never been tested on the living subject. Baudelocque tried it upon one patient and failed, and was obliged to resort to the proper Cæsarean operation in the case of a woman who had long been under his supervision.

Dr. Physie, about the same time proposed a plan somewhat akin to those of Ritgen and Baudelocque, which consisted in making an incision horizontally immediately above the pubis, and separating the peritoneum from the bladder and cervix uteri, which he avers is readily done in pregnant women, and which view is corroborated by the dissections of Dr. Horner. Having denuded the cervix uteri of the peritoneum an incision is made into it, through which the foetus is extracted. This method has never been employed upon the living subject that we are aware of, notwithstanding it was proposed by the father of American surgery.*

The ordinary method of performing Hysterotomy. The operation being determined upon, the surgeon's first duty is to prepare himself with a full supply of needles, ligatures, compresses, lint or charpie, bandages, cold and tepid water, sponges, strips of adhesive plaster, vinegar, brandy, etc., which should all be laid out on a table close at hand. He should be provided with two bistouries, one curved, the other straight and probe pointed; many sur-

* We are largely indebted to Velpeau, for those abstracts of his description of, and strictures upon, the different modes of performing Hysterotomy here presented.

geons, however, prefer a common scalpel. A pair of common pocket-case or dissecting forceps, and even a tenaculum may be needed in case of hemorrhage from the wounding of an important artery. The bladder and rectum must be emptied.

All the preliminaries being arranged, and the attendance of two or three intelligent and efficient assistants secured, the patient is to be placed upon a narrow bedstead, furnished with a straw, husk or hair mattress, and of convenient height, from which she is not to be removed during convalescence. The mattress should be so protected as to prevent its being wet by the discharges, and when the cloths are withdrawn, to leave the patient dry. While the incision is being made, she should lie upon her back, with the legs and thighs extended. Thus arranged, she is to be put fully under the influence of an anæsthetic, the most prompt and safest of which is equal parts of chloroform and sulph. ether. An assistant, experienced in the use of this agent, should have sole charge of this part of the operation. An intelligent assistant is to take charge of the abdomen, and, by placing his hands upon the sides of it, and making steady pressure, maintain the uterus on the median line, and prevent the intestines from interfering with the wound. The surgeon now makes an incision in the *linea alba*, extending from a little below the umbilicus to within an inch and a half of the pubis. By this incision, the skin and subcutaneous tissues are divided down to the aponeurosis, and must be at least six inches in length; then the aponeurosis must be carefully divided, laying bare the peritoneum. This membrane must be pinched up at the upper angle of the wound, and a small puncture made in it, in which must be introduced a director, or the index finger of the left hand, which may serve as such to guide the probe-pointed bistoury, in dividing the peritoneum, which must be done the whole length of the wound. The uterus is now brought into view; the hands of the assistant, pressing upon the sides of the abdomen, keep asunder the edges of the wound. An incision is to be made in the presenting anterior median line of the uterus, of a length corresponding to that in the *linea alba*. In dividing the uterine parieties, care should be taken not to wound the membranes containing the liquor amnii, lest it should escape into the cavity of the abdomen. There is a disagreement among authors as regards what should be the condition of the membranes, at the time of operating. Some hold they should be ruptured, so as to allow the waters to escape by the vagina, before the uterus is opened, and thus prevent them passing into the abdominal cavity. Others contend they should be maintained entire, as long as possible, as the waters prevent the contractions of the uterus, and thereby facilitate the extraction of the foetus; and that they must be prevented from entering the abdomen, through the vigilance of the third

assistant, who, with sponges or cloths, must absorb it as it rises to the wound, while the second assistant presses the edges of the wound in the abdomen close against the uterus, by the sides of the incision in it, and in this way prevent the water from entering the abdomen. We would suggest that, as a preparatory measure to the operation, a canula, armed with a stilet, such as Cazeaux recommends for puncturing the membranes, in inducing abortion and premature delivery, be introduced into the os uteri, and allowed to remain there until the time of opening the uterus; then, by pushing forward the stilet, puncture the sack, and allow the waters to pass off by the vagina, while the incision is being made in the uterus. Immediately, upon the uterus being laid open, the foetus must be seized by the most convenient part, removed, and given in charge of an assistant, and, without dividing the cord, the placenta and membranes must be grasped and removed. If the placenta remains attached, it must be separated with the fingers. It is advised by some, that the cord be ligated and divided, and the end passed through the os uteri, and the placenta delivered *per vias naturalis*, by the contractions; but, this may be attended with more difficulty than may be desirable under the circumstances, to avoid which, its extraction, by the artificial opening, is proper and advisable.

Where, from the size of the foetus, or the lowness of stature of the woman, the prescribed limits of the incision be found too small, it must be extended by continuing it around, a little to the left, and above the umbilicus. It should not approach too near the pubis, for fear of wounding the bladder.

After the uterus is opened, before extracting the foetus, the head and shoulders should be raised and bolstered up, and the thighs and legs be drawn up so as to relax the abdominal muscles, which position very much facilitates the removal of the uterine contents.

As soon as the foetus and secundines are removed, the hand should be passed into the cavity of the uterus, and all clots, or other obstructions that may interfere with the escape of the discharges, removed from the cervix and os.

No time should be lost in emptying the uterus, after it has been laid open, as the contractions may seriously interfere with this process. Dr. Wm. Warren Green, in a case which he recently operated on successfully, gave a full dose of the fluid extract of ergot, with a little brandy, before administering the ether, preparatory to commencing the operation. He speaks thus of its effects: "On carrying my right hand into the uterus, I readily seized the feet (which were on the left side, it being a vertex presentation), and, with little delay, extracted the body. Some difficulty was experienced in delivering the head, occasioned by the

*powerful and unremitting uterine contractions, intensified, as I suppose, by the ergot.”**

When the uterus is acting normally, the contractions constitute one of the principal difficulties in emptying it, after being incised. Dr. Green does not favor us with his reasons for giving the ergot, but such a course was certainly contra-indicated, unless the uterus had become inert, which was not the case, for he says, “her pains were strong and frequent,” when he was first called.

After the contents of the uterus are removed, and the parts cleansed by means of a sponge and tepid water, the lips of the external wound must be carefully brought together and secured by interrupted sutures, placed about an inch or two apart; these should include all the tissues, except the peritoneum. Silver wire is generally used for sutures, but Dr. Green says, “smooth, well twisted silk sutures soaked in boiling wax, approximate very closely in value those of silver.” Between the sutures must be applied adhesive straps, long enough to reach half way around the body. Space enough must be left between them, for the escape of such discharges as may form in the wound. Over these must be placed a thin bandage for the purpose of supporting the abdomen, and to assist in keeping the wound closed. The track of the wound must be covered by a layer of lint or charpie, for absorbing the discharges; the latter is preferable, because it does not become so compact as lint. Over this must be placed a compress, and the whole retained in position by a bandage, of sufficient width to reach from the scrobiculus cordis to the pubis, and drawn tight enough to be perfectly comfortable. This bandage must not be allowed to ride up, for by so doing the dressings would become deranged, and the object of their application defeated. A very simple and convenient arrangement for securing this object, consists in a strip of cotton cloth, about twelve inches in length, one end of which is pinned to the lower edge of the bandage in front, then carried under the perineum, and fastened, in like manner to its lower edge behind; this when sufficiently tight will effectually keep the bandage in its place.

The wound in the uterus will require no attention, as the contraction will diminish it to one quarter of its extent, and effect a perfect coaptation of its edges, and the healing process will be completed without any intervention of art.

After the abdomen is once opened, the operation must be conducted as rapidly as may be consistent with prudence and safety. The peritoneum should not be exposed to the action of the atmosphere longer than necessary, and the uterus should be subject to as little handling as possible.

* Boston Med. and Surg. Journal, Feb. 6, 1868.

After the operation the woman demands rest, an opiate of sufficient power to tranquillize what nervous agitation may be present, should be administered. Ext. hyoscyamus, or belladonna, may be exhibited where opium is inadmissible. Should exhaustion or debility exist, some stimulant may be given, as a little brandy and water, repeated *pro renata*. A little essence of beef, or some other light nutritious ingesta may be allowed.

The after treatment consists mainly in watching the patient, and guarding her against any inflammatory symptoms. Should these manifest themselves, they must be combatted with the utmost vigor, for in this her chief danger consists.

The bowels must be kept soluble; her apartment darkened, cool, and quiet; diet bland and nutritious; everything stimulating avoided, except when demanded by debility; in a word all the hygienic conditions surrounding her should be such as are most conducive to health.

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ERRATA.

In consequence of some unaccountable oversight the references to several figures, from the 24th to the 38th especially, are very erroneous; should the student become perplexed in referring to them, by turning to these errata he will find the errors corrected, and the references made to the proper figures. Many other mistakes that escaped notice will also be found corrected here.

PAGE.

- 6 In the last full line of first paragraph for "was" read had been.
- 8 Ninth line from bottom, for "has" read may have.
- 10 Third line from bottom, for "the promptness" read his promptness.
- 40 Second line from top, for "legs" read two legs.
- 88 Fourth and thirteenth lines, second paragraph, for "glands" read glans.
- 103 Second line from top, for "is" read are.
- 108 Second line third paragraph, for "21" read 24.
- 110 Second line from bottom, for "24" read 25.
- 113 Third and fourth lines, fourth paragraph, for "abugenia" read albugenia.
- 118 Third and fourth lines from top, for "25, 26, 29" read 26, 27, 30.
- 119 Fourth line, first paragraph, for "24" read 23.
- 121 First and eighth lines, second paragraph, and second line from bottom for "24" read 25.
- 156 Sixth line from bottom, for "germ" read gem.
- 178 Sixth line from bottom, for "geminai" read germinal.
- 180 Fifteenth line from top, for "37" read 38.
- 187 Eighth line from bottom, for "bronchial" read branchial.
- 190 Fifth and twelfth lines, second paragraph, for "bronchial" read branchial.
- 223 Sixteenth line from bottom, for "ration" read ratio.
- 231 Sixth line from top, for "parechyma" read parenchyma.
- 246 Sixth line from top, for "two" read to.
- 279 Fourth line from top, for "the instant" read the same instant.
- 283 First line, third paragraph, for "say" read says.
- 279 Third line, second paragraph, for "perorations" read peregrinations.
- 297 Eighth line from bottom, for "modulated" read nodulated.
- 330 Second line from bottom, for "peculiar" read peculiarly.
- 338 Ninth line, second paragraph, for "necontinent" read incontinent.
- 343 Eleventh line from bottom, for "this" read thus.
- 375 Third line, second paragraph, for "utero" read uterus.
- 388 Fourteenth line, third paragraph, for "gina" read vagina.
- 389 First line, second paragraph, for "placenta" read placento.
- 405 Third and fourth lines, prescription, for "Com." read Corn.
- 406 Fifteenth line from bottom, for "udication," read indication.
- 407 Seventh line, second paragraph, for "or" read in.
- 418 Seventh line from bottom, for "achievement" read act.
- 428 Third line from top, for "could be" read could not be.
- 428 Ninth line from bottom for "state" read stage.
- 452 Third line from top, for "attended" read unattended.
- 486 Nineteenth line from bottom, for "to" read by.
- 513 Fourteenth line from bottom, for "at the lower" read the lower.
- 515 Second line, third paragraph, for "3.6" read 36.
- 522 Reference under the plate, for "2" read 3, and for "3" read 2.
- 523 Sixth line from bottom, "eighth" read ninth,
- 529 Eleventh line from top, for "or such" read or any.
- 567 Thirteenth line from bottom, for "inflamed" read inflame.
- 572 First line, for "or of" read or that of.
- 581 Third line, second paragraph, for "the uteri" read the os uteri.
- 582 Sixth line, third paragraph, for "perceptible" read perceptibly.
- 615 Fourth line from top, for "os uteri" read os uteri, vagina or external.
- 631 Fourth line, third paragraph, for "recurrence" read occurrence.
- 648 Second line from bottom, for "that a" read that in a.
- 649 Top line, for "a" read as.
- 675 Fifth line from bottom, for "maturity" read maternity.
- 752 Foot-note, fourth line, for "bladder" read blade.



